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GENERAL NOTES

- Data in this report were collected by the Bureau of the Census for the National Science Foundation (NSF) in the Annual Survey of Industrial Research and Development and cover the periods 1956-84 for funding data and January 1957-January 1985 for personnel data.

- The footnote "Not separately available but included in total" indicates that data are being withheld for either of two reasons: to avoid disclosing the operations of an individual company, or, because the imputation rate--the percentage of the statistic that is estimated by the Bureau of the Census (Census)--exceeds 50 percent because some companies failed to supply the requested data. See table A-1 for the imputation rates of specific items.

- The industry survey does not cover trade associations. Although their primary mission is to serve industry, trade associations are established as nonprofit organizations and are covered in the NSF survey of independent nonprofit institutions. Research and development (R&D) expenditures of trade associations are estimated at less than 1 percent of the industry R&D total.

- Complete technical notes are contained in section A. Questions regarding these survey findings should be addressed to Melissa Pollak or Mary Burke, Industry Studies Group, Division of Science Resources Studies, National Science Foundation, Washington, D. C. 20550 (202) 634-4648.

SECTION A. TECHNICAL NOTES

Scope of Study

The National Science Foundation (NSF) sponsored its first survey of industrial research and development in 1953. Since then, the scope of the survey has gradually been expanded and refined in response to an increasing need for more detailed information on the Nation's research and development (R&D) effort.

The 1984 industry survey is the 28th in the annual series sponsored by NSF and conducted by the Bureau of the Census (Census), Department of Commerce. NSF also sponsored two industry surveys covering the 1953-56 period, which were conducted by the Bureau of Labor Statistics (BLS), Department of Labor. 1/ Data obtained in the BLS survey are not directly comparable with the Census figures for 1957-84 because of methodological and other differences in the surveys conducted by the two agencies. In addition, beginning in 1957, the Census surveys have collected data on the R&D activities of federally-funded research and development centers (FFRDC's) operated by business firms, whereas the earlier BLS surveys did not. FFRDC's are organizations administered by industrial, educational, or other institutions on a nonprofit basis; they conduct R&D activities almost exclusively for the use of the Federal Government. R&D expenditures of industry-administered FFRDC's are included in the Federal R&D data under the classifications of the administering firms. Total R&D expenditures and selected personnel data for FFRDC's are shown in table B-12. To account for the performance of these research centers in 1956, Census adjusted data for that year (collected in the 1957 survey) to provide comparable trend data for 1956 and earlier years.

Data on scientific personnel are not directly comparable with data in surveys formerly conducted by BLS. Census uses the company--defined to include all establishments under common ownership or control--as the basic reporting unit for these surveys of industrial research and development. The surveys of scientific and technical personnel conducted by BLS were on an establishment-reporting-unit basis. Further, the Census surveys obtain data on the number of R&D scientists and engineers on a full-time-equivalent (FTE) basis, unlike the BLS surveys in which data were provided in terms of scientists and engineers primarily employed in research and development.

Other variations in the two sets of data may have occurred because the estimate might have been prepared by different offices in the same company or because the response rates of the two surveys varied.

The statistics presented in this report are subject to response and concept errors caused by differences between survey and industry concepts and definitions of R&D activities, and by variations in company accounting procedures. Consequently, the accuracy of the data provided by respondents is subject to some variation.

Data quality has improved substantially since the first industry survey in 1953, mainly as a result of more accurate and sophisticated accounting procedures adopted by respondents. In addition, NSF and Census have endeavored to reduce response and concept errors arising from difficulties in interpreting or applying survey definitions.

NSF has been aware of the increased reporting burden placed on industry from all sources in recent years. In an effort to alleviate this burden, the detailed questionnaire (which has been in use with slight modifications since the beginning of the survey) is now mailed only biennially; an abbreviated form containing only the most crucial data elements is sent to survey respondents in the intervening years.

The shortened survey form was used for the first time to collect industrial R&D data for 1978. Because all data elements were not collected in even-numbered years, some historical tables do not contain data for these years and other tables were not printed. The main tables affected are those that give detailed breakdowns of R&D expenditures for basic research, applied research, and development by industry and by product field. Tables showing company-financed research and development contracted to outside organizations, Federal funds by agency, R&D expenditures by geographic area, and some detailed data on energy and pollution abatement R&D activities are also deleted in those years. (Beginning in 1984, the survey resumed collecting basic, applied, and development data annually.)

Survey Definitions 2/

Research and development--Basic and applied research in the sciences and engineering and the design and development of prototypes and processes. This definition excludes quality control, routine product testing, market research, sales promotion, sales service, research in the social sciences or psychology, and other nontechnological activities or technical services.

Basic research--Original investigations for the advancement of scientific knowledge not having specific commercial objectives, although such investigations may be in fields of present or potential interest to the reporting company.

Applied research==Investigations directed to the discovery of new scientific knowledge having specific commercial objectives with respect to products or processes. This definition differs from that of basic research chiefly in terms of the objectives of the reporting company.

Development--Technical activities of a nonroutine nature concerned with translating research findings or other scientific knowledge into products or processes. Not included are routine technical services to customers or other activities excluded from the foregoing definition of research and development.

Funds for research and development--Operating expenses incurred by a company in the conduct of research and development in its own laboratories or other company-owned or -operated facilities. Includes wages and salaries, materials and supplies consumed, property and other taxes, maintenance and repairs, depreciation, and an appropriate share of overhead, but excludes capital expenditures. All funds for R&D performance are expressed in current rather than constant dollars.

Federally-financed research and development--Receipts for work done by the company on Federal R&D contracts or subcontracts and R&D portions of procurement contracts and subcontracts.

Company-financed research and development--Cost of the company-sponsored research and development performed within the company. Does not include company-financed research and development contracted to outside organizations, such as research institutions, universities and colleges, or other nonprofit organizations.

R&D scientists and engineers--The January number of those engaged full time in research and development and the full-time equivalent of those working part time in research and development. Scientists and engineers are defined as persons engaged in scientific or engineering work at a level that requires a knowledge of physical, life, engineering, or mathematical sciences equivalent at least to that acquired through completion of a 4-year college program with a major in one of those fields.

Employment--Total number of persons domestically employed by the company in all activities during the pay period that includes the 12th of March. These data are not completely comparable with employment of R&D scientists and engineers data that are collected as of January.

Net sales and receipts--Recorded dollar values for goods sold or services rendered by a company to customers outside the company, including the Federal Government, less such items as returns, allowances, freight, charges, and excise taxes. Excludes domestic intracompany transfers as well as sales by foreign subsidiaries, but includes transfers to foreign subsidiaries and export sales to foreign companies.

Geographic area covered--Includes only those operations located in the 50 States and the District of Columbia. 3/

Explanation of Tabular Data

Industry classification--Industries and industry groups shown separately in statistical tables are classified according to their Standard Industrial Classification (SIC) Manual 4/ codes as follows:

- Food and kindred products (20)
- Textiles and apparel (22, 23)
- Lumber, wood products, and furniture (24, 25)
- Paper and allied products (26)
- Chemicals and allied products (28)
  - Industrial chemicals (281-82, 286) 5/
  - Drugs and medicines (283)
  - Other chemicals (284-85, 287-89) 5/
- Petroleum refining and related industries (29) 6/
- Rubber products (30)
- Stone, clay, and glass products (32)
- Primary metals (33)
  - Ferrous metals and products (331-32, 3398-99)
  - Nonferrous metals and products (333-36)
- Fabricated metal products (34)
- Machinery (35)
  - Office, computing, and accounting machines (357)
  - Other machinery, except electrical (351-56, 358-59)
- Electrical equipment (36) 6/
  - Radio and TV receiving equipment (365)
  - Communication equipment (366) 6/
  - Electronic components (367)
  - Other electrical equipment (361-64, 369)

Motor vehicles and motor vehicles equipment (371)
Other transportation equipment (373-75, 379)
Aircraft and missiles (372, 376) 7/
Professional and scientific instruments (38)
  Scientific and mechanical measuring instruments (381-82)
Optical, surgical, photographic, and other instruments (383-87)
Other manufacturing industries--tobacco manufacturers (21), printing and publishing (27), leather products (31), and miscellaneous manufacturing industries (39)
Nonmanufacturing industries--agriculture, forestry, and fisheries (07-09); mining and extraction (10-14); contract construction (15-17); transportation, communications, and other public utilities (41-49); wholesale and retail trade (50-59); finance, insurance, and real estate (60-67); and selected service industries (739, 807, 891).

Company size-class--The size of a company as determined by the total number of its employees. The following are the five company size-classes used in this report: fewer than 1,000 employees; 1,000 to 4,999 employees; 5,000 to 9,999 employees; 10,000 to 24,999 employees; and 25,000 or more employees.

Classification of reporting units--The company or corporate family that includes all establishments under common ownership or control is the basic reporting unit. Each company was similarly classified into a single size-category on the basis of its total employment.

Cost per R&D scientist or engineer--The number of R&D scientists and engineers used to estimate the cost per R&D scientist or engineer for 1957-84 is the arithmetic mean of the numbers of R&D scientists and engineers reported in each industry for January in two consecutive years. This number is then divided into total R&D expenditures in each industry. For example, the mean of the numbers of R&D scientists and engineers in January 1984 and January 1985 is divided into total 1984 R&D expenditures for a total cost per R&D scientist or engineer in 1984.

Nonavailability of certain statistics--Tables in section B use footnotes stating "Not separately available but included in total," indicating that statistics are withheld because they do not meet publication standards for the following reasons: (1) Extremely high associated sampling error of estimate; (2) high rate of imputation (over 50 percent) because of failure of companies to supply data; (3) possible disclosure of data on an individual company; or, (4) data inconsistent for inclusion in a time series. In some instances, withheld data can be derived by subtraction from higher level totals. Where this is possible, the data user should be aware that the derived numbers are statistically unreliable. In no instance, however, can any data be derived that would disclose the operations of an individual company.

Questionable data--Data where over 50 percent of the total has been estimated are not published. Users should consult table A-1 for imputation rates for specific items.

Method of computation--Detailed statistics in the tables may not add to totals or subtotals because of rounding. Also, percentages were calculated on the basis of thousands of dollars and may differ from those based on the rounded figures shown.

Methodology of Survey 8/

The sample used for the 1984 Survey of Industrial Research and Development represents all manufacturing industries and those nonmanufacturing industries known, on the basis of earlier, more detailed samples, to conduct or to finance research and development. The sampling unit for the survey was the company, defined as a business organization consisting of one or more establishments under common ownership or control. A new panel for the R&D survey is selected approximately every five years. The newest sample was selected for the 1981 survey (the first since the 1976 survey). Approximately 11,500 manufacturing and nonmanufacturing companies are included in this sample, which consists of about 4,500 certainty companies (those with 500 or more employees that have a 100-percent chance of inclusion in the panel) and about 7,000 noncertainty companies.

The basic tool for the survey is Form RD-1, which is used to collect detailed R&D information. Companies in the new panel that received an RD-1 form in the old panel once again received an RD-1 form in 1981 (about 1,200 companies). The remaining certainty (about 3,300) companies and noncertainty companies (about 7,000) in the new panel received an RD-1A survey form for 1981. Form RD-1A is an abbreviated version of RD-1 and is generally mailed only to companies in the year in which a new sample is drawn. The purpose of Form RD-1A is to canvass, with a minimum of reporting burden, smaller R&D performers. Once the RD-1A forms were received and tabulated from the survey respondents in 1981, they were reviewed for total R&D expenditures. Those companies that reported R&D expenditures exceeding $1,000,000 on the RD-1A form were added to the survey panel consisting of those firms that receive the RD-1 form annually--about 575 such companies in 1981. Data for remaining RD-1A companies in subsequent years are estimated by Census based upon their 1981 reports.

The universe frame from which the latest sample panel was selected was created from two sources--the 1981 Standard Statistical Establishment List (SSEL) for single units and the 1981 Enterprise Statistics Multiunits file.

There are about 3.5 to 4 million single-unit firms in the 1981 SSEL file (including nonmanufacturing firms). There are 5.6 million multiunit companies in the 1981 Enterprise file, of which 296,146 companies have identified themselves as being primarily in manufacturing. All manufacturing industries and selected nonmanufacturing industries (SIC's 49, 7391, 7392, 7399, and 8911) were considered within the scope of the survey.

Companies in these industries with 500 or more employees were included in the panel with certainty. For the companies with fewer than 500 employees, a measure of size was assigned to each company based on an estimate of its total R&D expenditures. Probabilities of selection were then assigned based on the measure of size. Finally, a sample selection process gave each company an independent chance of being included in the sample.

Each year Census reviews the annual lists of R&D contractors published by the Department of Defense (DOD) and the National Aeronautics and Space Administration (NASA) to ensure that the large contractors are included in the sample. For the 1984 survey, the R&D-performing manufacturing companies from the largest DOD and NASA contractors were included in the reporting panel with certainty.

The particular sample selected is one of a large number of samples of the same type and size that, by chance, might have been selected. Estimates from each of the different samples would differ somewhat from each other and from the results of a complete canvass conducted under essentially the same conditions as the survey. This variation among the possible estimates is defined by the sampling error, measured in standard error units. The complete canvass total would be included in the range--(1) from one standard error below to one standard error above the derived estimate for about two-thirds of all possible samples; (2) from two standard errors below to two standard errors above the derived estimate for about 95 percent of all possible samples; and (3) from three standard errors below to three standard errors above the derived estimate, almost always.

An inference that the comparable complete canvass total would be within the indicated ranges would be correct in approximately the relative frequencies shown. Those proportions, therefore, may be interpreted as defining the confidence that the estimates from a particular sample would differ from complete coverage results by as much as one, two, or three standard errors, respectively.

For example, suppose an estimated total is shown as 400 with an associated relative standard error of 2 percent. Then, there is approximately 67-percent confidence that the interval 392 to 408 includes the complete canvass total, about 95-percent confidence that the interval 384 to 416 includes the complete canvas total, and almost certain confidence that the interval 376 to 424 includes the complete canvass total.

In addition to the sampling errors as measured by the standard error, the estimates are subject to errors in response, coding, processing, and imputation for nonresponse. These nonsampling errors would also occur if a complete canvass were to be conducted under the same conditions as the survey (table A-2).

The forms for the survey were mailed in January 1985, and nonrespondents received followup letters by mail. Since total R&D performance funds, total Federal R&D funds, total net sales, and total employment are included in the Census's mandatory statistical program, the few companies that did not reply to Form RD-1 for 1984 were mailed the Census Form MA-121, which collects these mandatory items.

In the absence of respondent-distributed data, the Census has estimated data for items as required in accordance with past performance and industry averages. Table A-1 shows imputation rates for many survey items.

Comparability of Data over a Period of Several Years

In the survey of industrial research and development, there is substantial comparability over any 2-year period. Before mailing the survey forms each year, Census enters on each one the previous year's figures as reported by the respondent. The respondent is asked to adjust data for the previous year as necessary to make them comparable to those data being reported for the current year. Such adjustments are made to reflect, for example, changes in reporting concepts or changes in company structure such as mergers or acquisitions. To maintain some measure of consistency, the employment-size classification of any company affected by such changes has been adjusted so that the company is tabulated in the same employment-size category for two consecutive years.

Some measure of the degree of change reflecting these adjustments in contrast to an actual change in R&D activity can be gained by comparing figures for the same year reported for two succeeding reporting periods, e.g., R&D statistics in the final report of the 1983 survey and the revised 1982 R&D statistics in the final report of the 1984 survey. The totals for broad classifications are likely to be very close in the two reports; larger differences are noticeable in the finer detail. The results underscore the point that the measures are approximate and indicative rather than precise.

Industry Codes for 1967-84 9/

The industry codes appearing in the tables are based on the 1972 SIC Manual. The SIC code for individual companies for 1967-74 (which were utilized in the publications for those years) were originally determined by data reported in the 1967 Economic Censuses. The SIC classifications for individual companies for 1977-79 (which were utilized in the publications for those years) were originally determined by the 1974 SSEL file. Between 1967 and 1974 and again between 1977 and 1979, the SIC code for a company on the R&D survey generally remained fixed and reflected that company's principal activity as of 1967 or 1976. Under certain circumstances, however, such as the merger of two or more companies, the acquisition of one company by another, or the formation of conglomerates, the 1967 or 1976 SIC code for a company could have changed. Census could not be aware of a possible new SIC code for a company until the 1976 or 1981 new sample was drawn based upon the 1974 or 1981 SSEL file. (See the foregoing description of the new sample.) When the new sample was selected in each of the years 1976 and 1981, the industry codes of companies in both the old and new panels were examined for possible changes. The historical R&D tables (for example, 1968-74 and 1977-79) have been adjusted to reflect the change in company activities. Because it is not known normally when a company changed its industrial activities, the data were adjusted in the following fashion: For companies changing industry codes between 1967 and 1974, the industry total for each of the years affected (1968 through 1974) were estimated to have changed at a constant rate of 14.3 percent per year. Accordingly, the data for the industry in which such a company had been classified in 1967 were deflated by 14.3 percent per year for each of the years 1968-74 (for example, 14.3 percent subtracted in 1968, 28.6 percent in 1977, 42.9 percent in 1970, etc.). Similarly, data for the industry in which such a company was classified in 1974 were inflated by 14.3 percent per year for each of the years 1968-74. The industry code assigned to a company for 1981 was also used to classify that company's activities for 1982-84.

To reflect changes in industry classification between 1976 and 1981, a nonlinear algorithm was used which is intended to link the two sample years while preserving the original year-to-year industry trend as much as possible. Estimates for 1976 remained unchanged since they were based on accurate classifications of companies at that time. Revised estimates for 1980 were formed based upon prior period data that were collected in the new 1981 sample. Thus, the revised estimates reflect the most recent classification. Based on the 1976 estimates and the revised 1981 estimates, data for each industry grouping for the years 1977, 1978, and 1979 were revised.

The following measures were adjusted in the manner just described: Number of scientists and engineers; funds for research and development--total, Federal, and company; net sales; cost per R&D scientist or engineer; and basic reseach expenditures. Historical data for the other categories appear in selected tables of this publication. (See tables B-2, B-5, B-9, B-18, B-19, B-27, and B-38.) No adjustments were made in other data elements

Footnotes

1/ National Science Foundation, Science and Engineering in American Industry. Final Report on a 1953-54 Survey (NSF 56-16) and Science and Engineering in American Industry, 1956 (NSF 59-50) (Washington, D.C.: Supt. of Documents, U.S. Government Printing Office, 1956 and 1960).

2/ For more detailed information on definitions, as well as the instructions for individual items covered in the survey questionnaire, see section c.

3/ For purposes of comparison, company-sponsored research and development by foreign subsidiaries of U.S. domestic companies performed outside the United States is reported in table B-7 but excluded from all other tables.

4/ Executive Office of the President, Office of Management and Budget, Standard Industrial Classification Manual, 1972 (Washington, D.C.: Supt. of Documents, U.S. Government Printing Office). Industry group code numbers are shown in parentheses.

5/ The classification "Industrial Chemicals" has been revised to include SIC Group 286, Industrial Organic Chemicals. All current and historical tables have been revised accordingly.

6/ Starting with the 1978 survey, oil and gas extraction (13) was no longer grouped with petroleum refining (29), and communication (48) was no longer grouped with electrical equipment (36). Instead, firms in these SIC groups may be included in the nonmanufacturing sector so that the delineation between manufacturing and nonmanufacturing industries is more consistent. This change has had almost no effect on the levels of the data. It is likely that there will be a change in how communication companies are classified beginning with the 1987 survey.

7/ Companies primarily engaged in the manufacture of ordnance and accessories, including complete guided missiles, are grouped with companies primarily engaged in the manufacture of aircraft and parts because of close similarity of R&D activities carried out by major companies in the two industries.

8/ This section was prepared in the Industry Division of the Bureau of the Census, the collecting and compiling agent for the National Science Foundation in this survey.

9/ For a discussion of industry codes for 1966 and earlier years, see National Science Foundation, Research and Development in Industry, 1975. Funds, 1975; Scientists & Engineers, January 1976 NSF 77-324), and Research and Development in Industry, 1970. Funds, 1970; Scientists & Engineers, January 1971 (NSF 72-309) (Washington, D.C.: Supt. of Documents, U.S. Government Printing Office, 1978 and 1972).

Table A-1. Imputation rates for selected items on the research and development survey by industry: 1984

[Percent]

Industry	SIC code	Item 2		Item 4	Item 5 R&D Expenditures Total R&D			Item 6		Item 7
		Sales[1]	Employment[1]	Scientists/ engineers[1]	Total[1]	Company[1]	Federal[1]	Energy R&D	Pollution abatement	Foreign R&D
Total	....	3.7	4.7	31.5	2.4	3.3	1.4	34.8	50.2	12.5
Distribution by industry										
Food and kindred products	20	8.1	11.2	55.2	12.0	12.0	-	60.2	19.1	9.0
Textiles and apparel	22,23	5.6	16.2	35.6	4.9	5.0	-	34.8	62.0	72.9
Lumber, wood products, and furniture	24,25	8.0	24.8	68.9	5.1	5.1	-	26.1	-	-
Paper and allied products	26	0.2	0.3	14.1	2.7	2.7	-	2.6	6.8	0.7
Chemicals and allied products	28	8.0	2.5	38.9	1.4	1.5	-	30.6	7.7	12.9
Industrial chemicals	281-82,286	14.8	4.9	24.8	2.5	2.7	-	31.9	6.9	10.1
Drugs and medicines	283	-	0.1	52.6	0.2	0.2	-	2.8	25.4	16.9
Other chemicals	284-85,287-89	0.6	0.2	32.5	1.8	1.9	-	14.3	11.1	3.3
Petroleum refining and related industries	29	-	-	44.8	-	-	-	31.9	18.6	49.9
Rubber products	30	2.2	2.9	68.2	3.5	4.4	-	8.6	29.6	83.1
Stone, clay, and glass products	32	-	-	29.4	-	-	-	46.9	74.3	44.5
Primary metals	33	10.5	10.0	30.9	9.9	15.2	-	54.7	24.1	85.6
Ferrous metals and products	331-32,3398-99	8.8	10.0	21.2	7.4	13.5	-	31.5	24.3	65.1
Nonferrous metals and products	333-36	14.3	9.9	44.6	14.5	17.2	0.1	68.0	23.7	96.5
Fabricated metal products	34	15.3	14.0	73.2	14.3	12.5	35.2	96.1	48.0	13.6
Machinery	35	3.8	8.5	47.5	3.1	3.7	-	39.3	10.7	4.7
Office, computing, and accounting machines	357	3.5	10.1	48.9	3.0	3.6	-	78.1	-	0.1
Other machinery, except electrical	351-56,358-59	3.9	7.3	44.6	3.3	3.8	-	32.1	10.7	4.7
Electrical equipment	36	2.2	1.9	24.7	1.8	4.4	-	2.6	2.6	3.6
Radio and TV receiving equipment	365	0.2	0.5	84.6	0.7	1.2	-	-	-	93.0
Communication equipment	366	2.1	1.2	11.6	2.1	3.6	-	-	-	0.5
Electronic components	367	2.6	2.8	43.6	1.3	1.6	0.3	69.5	71.7	6.5
Other electrical equipment	361-64,369	2.6	2.8	15.1	1.6	9.7	0.1	2.5	1.6	9.8
Motor vehicles and motor vehicles equipment	371	-	-	2.4	-	-	-	95.0	88.0	-
Other transportation equipment	373-75,379	0.2	0.5	84.3	5.7	2.5	9.6	16.4	15.3	-
Aircraft and missiles	372,376	2.8	2.8	4.3	1.7	3.3	1.7	38.3	11.2	6.3
Professional and scientific instruments	38	2.2	2.6	67.1	2.7	2.9	1.5	6.9	-	44.2
Scientific and mechanical measuring instruments	381-82	2.7	3.4	75.4	3.3	3.8	1.2	6.7	-	93.3
Optical, surgical, photographic, and other instruments	383-87	1.8	2.0	50.5	2.1	2.1	2.1	67.5	-	5.7
Other manufacturing industries	21,27,31,39	1.8	2.9	61.4	0.9	1.0	-	17.4	27.9	68.7
Nonmanufacturing industries	07-17,41-67, 737,739,807,891	3.9	4.3	20.7	6.4	6.8	5.8	20.4	5.3	27.4

- Represents no imputation.

[1] These items calculated from Form RD-1 (detailed form mailed to large corporations conducting research and development) and from Form RD-1A (abbreviated version of RD-1 form mailed to smaller R&D performers). All other items calculated from Form RD-1 only; RD-1A respondents were not asked these questions.

Table A-2. Standard error of estimate (percentage) of funds for R&D performance for all company size-groups and for companies with fewer than 1,000 employees by industry: 1984

Industry	SIC code	Standard error[1]	Standard error of companies with fewer than 1,000 employees
Total	....	1	15
Food and kindred products	20	(2)	14
Textiles and apparel	22,23	3	24
Lumber, wood products, and furniture	24,25	1	24
Paper and allied products	26	(2)	31
Chemicals and allied products	28	1	8
Industrial chemicals	281-82,286	(2)	13
Drugs and medicines	283	3	21
Other chemicals	284-85,287-89	1	11
Petroleum refining and related industries	29	(2)	6
Rubber products	30	3	33
Stone, clay, and glass products	32	2	32
Primary metals	33	2	27
Ferrous metals and products	331-32,3398-99	1	26
Nonferrous metals and products	333-36	6	36
Fabricated metal products	34	8	36
Machinery	35	1	9
Office, computing, and accounting machines	357	1	16
Other machinery, except electrical	351-56,358-59	2	11
Electrical equipment	36	(2)	9
Radio and TV receiving equipment	365	2	33
Communication equipment	366	(2)	10
Electronic components	367	1	20
Other electrical equipment	361-64,369	1	19
Motor vehicles and motor vehicles equipment	371	(2)	30
Other transportation equipment	373-75,379	(2)	14
Aircraft and missiles	372,376	1	93
Professional and scientific instruments	38	1	15
Scientific and mechanical measuring instruments	381-82	3	23
Optical, surgical, photographic, and other instruments	383-87	1	11
Other manufacturing industries	21,27,31,39	2	12
Nonmanufacturing industries	07-17,41-67,737, 739,807,891	18	47

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[1] A description of the standard error of estimate is given in section A under "Methodology of Survey." The percentage (or relative) standard errors in this table may be converted to standard errors of estimate by multiplying the percentage shown by the associated estimate. For example, the relative standard error of estimate for R&D performance for all company size groups in the machinery industry (SIC 35) is shown as 1 percent, and the associated total R&D estimate for this industry is shown as $9,671 million in table B-2, "Funds for research and development by industry and size of company: 1984." The standard error of estimate, then, is .01 times 9,671 or 96.71.

[2] Less than 0.5 percent.

SECTION B. STATISTICAL TABLES

In all tables of this report

- o Details may not add to totals because of rounding.
- o Percentages were calculated on the basis of thousands of dollars and may differ from those based on the rounded figures shown.
- o Percentage changes are increases unless otherwise indicated.

Page

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Table B-1. Trends in funds for industrial research and development by source: 1956-84

[Dollars in millions]

Year	Total R&D		Federal		Company[1]	
	Amount	Percent change from previous year	Amount	Percent of total	Amount	Percent of total
1956	$6,605	42	$3,328	50	$3,277	50
1957	7,731	17	4,335	56	3,396	44
1958	8,389	9	4,759	57	3,630	43
1959	9,618	15	5,635	59	3,983	41
1960	10,509	9	6,081	58	4,428	42
1961[2]	10,908	4	6,240	57	4,668	43
1962	11,464	5	6,434	56	5,029	44
1963	12,630	10	7,270	58	5,360	42
1964	13,512	7	7,720	57	5,792	43
1965	14,185	5	7,740	55	6,445	45
1966	15,548	10	8,332	54	7,216	46
1967	16,385	5	8,365	51	8,020	49
1968	17,429	6	8,560	49	8,869	51
1969	18,308	5	8,451	46	9,857	54
1970	18,067	-1	7,779	43	10,288	57
1971	18,320	1	7,666	42	10,654	58
1972	19,552	7	8,017	41	11,535	59
1973	21,249	9	8,145	38	13,104	62
1974	22,887	8	8,220	36	14,667	64
1975	24,187	6	8,605	36	15,582	64
1976	26,997	12	9,561	35	17,436	65
1977	29,825	10	10,485	35	19,340	65
1978	33,304	12	11,189	34	22,115	66
1979	38,226	15	12,518	33	25,708	67
1980	44,505	16	14,029	32	30,476	68
1981	51,810	16	16,382	32	35,428	68
1982	57,996	12	18,483	32	39,512	68
1983	63,403	9	20,542	32	42,861	68
1984	71,137	12	23,072	32	48,065	68

[1] Company funds include all funds for industrial R&D work performed within company facilities except funds provided by the Federal Government. Excluded are company-financed research and development contracted to outside organizations such as research institutions, universities and colleges, or other nonprofit organizations.

[2] Funds by source estimated by the National Science Foundation.

SOURCE: National Science Foundation.

Table B-2. Funds for research and development by industry and size of company: 1956, 1958, 1963, 1967, 1972, and 1974-84

[Dollars in millions]

Industry and size of company	SIC code	1956	1958	1963	1967	1972	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Total		$6,605	$8,389	$12,630	$16,385	$19,552	$22,887	$24,187	$26,997	$29,825	$33,304	$38,226	$44,505	$51,810	$57,996	$63,403	$71,137
Distribution by industry																	
Food and kindred products	20	64	83	130	183	259	298	335	355	415	472	528	620	(1)	(1)	(1)	(1)
Textiles and apparel	22,23	(1)	26	30	57	61	69	70	82	83	89	101	115	(1)	(1)	(1)	(1)
Lumber, wood products, and furniture	24,25	(1)	12	11	12	64	84	88	107	123	126	139	148	161	162	169	181
Paper and allied products	26	36	42	69	128	189	237	249	313	333	387	445	495	(1)	626	(1)	(1)
Chemicals and allied products	28	641	792	1,239	1,507	1,932	2,450	2,727	3,017	3,202	3,580	4,038	4,636	5,625	6,659	7,293	8,024
Industrial chemicals	281-82,286	460	553	809	966	1,031	1,299	1,391	1,524	1,668	1,798	1,962	2,197	2,802	3,301	3,411	3,548
Drugs and medicines	283	94	128	216	343	607	807	981	1,091	1,117	1,308	1,517	1,777	(1)	(1)	(1)	(1)
Other chemicals	284-85,287-89	87	111	214	198	294	344	354	401	417	474	559	662	(1)	(1)	(1)	(1)
Petroleum refining and related industries	29	182	246	317	371	468	622	693	767	918	1,060	1,262	1,552	(1)	(1)	(1)	(1)
Rubber products	30	(1)	89	156	182	377	469	467	502	491	493	577	656	(1)	(1)	(1)	(1)
Stone, clay, and glass products	32	[2]60	[2]75	100	136	183	217	233	263	287	324	356	406	(1)	(1)	(1)	(1)
Primary metals	33	90	131	183	242	277	358	443	506	538	560	634	728	878	1,000	1,115	1,093
Ferrous metals and products[3]	331-32,3398-99	(1)	80	106	135	146	181	215	256	284	314	375	443	(1)	(1)	(1)	(1)
Nonferrous metals and products[3]	333-36	(1)	51	77	107	130	177	228	250	254	246	259	285	(1)	(1)	(1)	(1)
Fabricated metal products	34	116	162	153	163	253	313	324	358	386	384	455	550	624	568	604	756
Machinery	35	543	781	958	1,326	2,158	2,985	3,196	3,487	3,880	4,283	4,825	5,901	6,818	7,835	8,386	9,671
Office, computing, and accounting machines	357	(4)	(4)	(4)	(4)	1,456	2,103	2,220	2,402	2,655	2,883	3,214	3,962	(1)	(1)	(1)	(1)
Other machinery, except electrical	351-56,358-59	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	1,225	1,400	1,611	1,939	(1)	(1)	(1)	(1)
Electrical equipment	36	1,516	1,969	2,868	3,867	4,680	5,011	5,105	5,636	5,886	6,507	7,824	9,175	10,329	11,642	13,950	15,122
Radio and TV receiving equipment	365	(6)	(6)	(6)	45	48	51	50	52	96	130	245	556	(1)	(1)	(1)	(1)
Communication equipment	366	(1)	868	1,773	2,425	2,583	2,424	2,385	2,511	2,725	2,999	3,635	4,024	4,758	5,750	7,112	7,715
Electronic components	367					330	489	549	691	770	902	1,169	1,547	1,573	1,661	1,964	2,441
Other electrical equipment	361-64,369	(1)	1,101	1,093	1,397	1,719	2,047	2,121	2,382	2,295	2,476	2,775	3,048	(1)	(1)	(1)	(1)
Motor vehicles and motor vehicles equipment	371	688	856	1,090	1,354	1,954	2,389	2,340	2,778	3,358	3,879	4,509	4,955	4,806	4,807	5,337	6,090
Other transportation equipment	373-75,379					56	87	90	94	120	131	159	162	(1)	(1)	(1)	(1)
Aircraft and missiles	372,376	2,138	2,609	4,712	5,669	4,950	5,278	5,713	6,339	7,033	7,536	8,041	9,198	11,968	13,658	13,853	16,076
Professional and scientific instruments	38	200	294	284	542	838	1,075	1,173	1,331	1,571	1,998	2,505	3,029	3,614	4,019	4,444	4,910
Scientific and mechanical measuring instruments	381-82	97	156	70	104	163	221	266	325	452	670	950	1,352	(1)	(1)	(1)	(1)
Optical, surgical, photographic, and other instruments	383-87	103	138	214	438	675	854	907	1,007	1,119	1,328	1,555	1,677	(1)	(1)	(1)	(1)
Other manufacturing industries	21,27,31,39	(1)	105	54	90	146	177	205	217	243	266	288	364	(1)	(1)	(1)	(1)
Nonmanufacturing industries	07-17,41-67,737, 739,807,891	(1)	117	276	559	707	768	735	845	958	1,229	1,540	1,815	1,906	2,005	2,189	2,633
Less than 1,000		369	532	619	687	929	1,058	1,222	1,384	1,353	1,438	1,764	2,065	2,305	2,501	2,992	3,557
1,000 to 4,999		[2]550	642	1,022	1,017	1,215	1,370	1,385	1,500	1,526	1,931	2,483	2,701	3,148	3,599	3,566	4,395
5,000 to 9,999		[2]5,686	7,215	10,989	892	1,076	1,346	1,478	1,648	1,829	1,551	1,691	2,028	2,988	2,756	2,848	3,175
10,000 to 24,999					13,790	2,159	2,416	2,633	2,874	3,418	4,278	5,191	6,017	6,762	7,816	9,017	10,332
25,000 or more						14,173	16,697	17,469	19,591	21,699	24,106	27,097	31,693	36,607	41,322	44,980	49,678

[1] Not separately available but included in total. See general notes.
[2] Estimated by the National Science Foundation.
[3] SIC codes 3398 and 3399 included in the nonferrous metals and products group for 1956-63.
[4] Data not tabulated at this level prior to 1972.
[5] Data not tabulated at this level prior to 1977.
[6] Included in the other electrical equipment group.

SOURCE: National Science Foundation.

Table B-3. Funds for research and development by industry and size of company: 1984

[Dollars in millions]

Industry	SIC code	Total	Companies with total employment of--				
			Less than 1,000	1,000 to 4,999	5,000 to 9,999	10,000 to 24,999	25,000 or more
Total		$71,137	$3,557	$4,395	$3,175	$10,332	$49,678
Food and kindred products	20	(1)	29	82	130	(1)	(1)
Textiles and apparel	22,23	(1)	(1)	(1)	11	57	(1)
Lumber, wood products, and furniture	24,25	181	10	44	24	(1)	(1)
Paper and allied products	26	(1)	(1)	62	32	(1)	429
Chemicals and allied products	28	8,024	278	(1)	(1)	2,969	3,418
Industrial chemicals	281-82,286	3,548	(1)	(1)	(1)	362	2,647
Drugs and medicines	283	(1)	(1)	(1)	125	(1)	(1)
Other chemicals	284-85,287-89	(1)	(1)	233	100	(1)	(1)
Petroleum refining and related industries	29	(1)	13	(1)	9	(1)	1,839
Rubber products	30	(1)	108	(1)	(1)	(1)	(1)
Stone, clay, and glass products	32	(1)	38	(1)	53	(1)	(1)
Primary metals	33	1,093	(1)	153	(1)	108	(1)
Ferrous metals and products	331-32,3398-99	(1)	17	(1)	(1)	(1)	(1)
Nonferrous metals and products	333-36	(1)	(1)	(1)	46	(1)	89
Fabricated metal products	34	756	(1)	(1)	(1)	(1)	(1)
Machinery	35	9,671	589	868	(1)	(1)	6,883
Office, computing, and accounting machines	357	(1)	(1)	469	164	(1)	(1)
Other machinery, except electrical	351-56,358-59	(1)	(1)	399	(1)	(1)	(1)
Electrical equipment	36	15,122	514	663	604	2,204	11,137
Radio and TV receiving equipment	365	(1)	(1)	(1)	4	(1)	(1)
Communication equipment	366	7,715	(1)	213	(1)	1,156	5,961
Electronic components	367	2,441	(1)	(1)	(1)	(1)	1,316
Other electrical equipment	361-64,369	(1)	(1)	226	(1)	(1)	(1)
Motor vehicles and motor vehicles equipment	371	6,090	(1)	28	(1)	(1)	(1)
Other transportation equipment	373-75,379	(1)	(1)	17	15	6	235
Aircraft and missiles	372,376	16,076	(1)	158	(1)	875	14,373
Professional and scientific instruments	38	4,910	(1)	373	(1)	(1)	3,194
Scientific and mechanical measuring instruments	381-82	(1)	(1)	286	(1)	372	1,445
Optical, surgical, photographic, and other instruments	383-87	(1)	(1)	87	69	(1)	(1)
Other manufacturing industries	21,27,31,39	(1)	(1)	148	54	(1)	(1)
Nonmanufacturing industries	07-17,41-67,737, 739,807,891	2,633	978	649	(1)	(1)	(1)

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[1] Not separately available but included in total. See general notes.

SOURCE: National Science Foundation.

Table B-4. Funds for research and development by industry, size of company, and size of R&D program: 1984

Industry and size of company	SIC code	Total	R&D size of program [thousands of dollars]				
			Less than $200	$200 to $999	$1,000 to $9,999	$10,000 to $99,999	$100,000 or more
			[Millions of dollars]				
Total	....	$71,137	$457	$763	$3,561	$10,325	$56,031
Food and kindred products	20	(1)	(1)	(1)	147	656	0
Textiles and apparel	22,23	(1)	(1)	17	51	61	0
Lumber, wood products, and furniture	24,25	181	7	12	49	113	0
Paper and allied products	26	(1)	2	14	(1)	311	(1)
Chemicals and allied products	28	8,024	42	83	336	1,766	5,797
Industrial chemicals	281-82,286	3,548	5	31	129	700	2,685
Drugs and medicines	283	(1)	(1)	24	(1)	653	(1)
Other chemicals	284-85,287-89	(1)	(1)	28	(1)	414	(1)
Petroleum refining and related industries	29	(1)	(1)	2	34	75	2,150
Rubber products	30	(1)	(1)	(1)	(1)	(1)	(1)
Stone, clay, and glass products	32	(1)	(1)	30	54	389	140
Primary metals	33	1,093	5	18	137	565	368
Ferrous metals and products	331-32,3398-99	(1)	(1)	15	74	252	368
Nonferrous metals and products	333-36	(1)	(1)	3	63	313	0
Fabricated metal products	34	756	30	57	215	328	126
Machinery	35	9,671	92	165	627	1,396	7,390
Office, computing, and accounting machines	357	(1)	(1)	38	235	561	6,415
Other machinery, except electrical	351-56,358-59	(1)	(1)	127	392	835	975
Electrical equipment	36	15,122	45	131	488	1,428	13,029
Radio and TV receiving equipment	365	(1)	(1)	10	(1)	(1)	(1)
Communication equipment	366	7,715	14	37	85	494	7,086
Electronic components	367	2,441	16	13	161	468	1,783
Other electrical equipment	361-64,369	(1)	(1)	71	(1)	(1)	(1)
Motor vehicles and motor vehicles equipment	371	6,090	2	10	48	236	5,793
Other transportation equipment	373-75,379	(1)	(1)	(1)	28	(1)	(1)
Aircraft and missiles	372,376	16,076	1	8	235	302	15,531
Professional and scientific instruments	38	4,910	34	82	461	513	3,820
Scientific and mechanical measuring instruments	381-82	(1)	(1)	43	(1)	377	(1)
Optical, surgical, photographic, and other instruments	383-87	(1)	(1)	39	(1)	137	(1)
Other manufacturing industries	21,27,31,39	(1)	(1)	20	124	427	0
Nonmanufacturing industries	07-17,41-67,737, 739,807,891	2,633	81	63	344	1,410	736
Distribution by size of company (based on number of employees)							
Less than 1,000	....	3,557	449	629	1,595	882	0
1,000 to 4,999	....	4,395	(1)	(1)	1,344	2,722	208
5,000 to 9,999	....	3,175	(1)	(1)	368	1,818	976
10,000 to 24,999	....	10,332	(1)	(1)	(1)	3,049	7,138
25,000 or more	....	49,678	(1)	(1)	(1)	1,854	47,709

[1] Not separately available but included in total. See general notes.

SOURCE: National Science Foundation.

Table B-5. Company funds for research and development by industry and size of company: 1957-58, 1963, 1967, 1972, and 1974-84

[Dollars in millions]

Industry and size of company	SIC code	1957	1958	1963	1967	1972	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Total		$3,396	$3,630	$5,360	$8,020	$11,535	$14,667	$15,582	$17,436	$19,340	$22,115	$25,708	$30,476	$35,428	$39,512	$42,861	$48,065
Distribution by industry																	
Food and kindred products	20	74	77	(1)	181	258	297	(1)	(1)	(1)	(1)	(1)	(1)	636	762	766	834
Textiles and apparel	22,23	14	20	(1)	(1)	61	(1)	(1)	(1)	(1)	(1)	(1)	(1)	116	124	125	139
Lumber, wood products, and furniture	24,25	14	12	(1)	12	(1)	(1)	88	106	123	126	139	148	161	162	169	181
Paper and allied products	26	35	42	69	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	495	566	626	674	782
Chemicals and allied products	28	616	666	1,004	1,297	1,741	2,236	2,490	2,751	2,907	3,250	3,692	4,264	5,205	6,226	6,845	7,802
Industrial chemicals	281-82,286	423	443	662	785	860	1,105	1,173	1,275	1,387	1,473	1,617	1,856	2,393	2,879	2,970	3,334
Drugs and medicines	283	104	126	207	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	1,756	2,064	2,490	2,937	3,401
Other chemicals	284-85,287-89	89	97	135	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	653	747	856	938	1,066
Petroleum refining and related industries	29	200	234	296	355	454	603	(1)	715	842	939	1,109	1,401	1,780	1,981	2,030	2,177
Rubber products	30	70	68	111	160	255	(1)	(1)	(1)	(1)	(1)	(1)	(1)	598	665	743	841
Stone, clay, and glass products	32	(1)	(1)	97	134	168	203	(1)	(1)	(1)	(1)	(1)	363	411	414	451	508
Primary metals	33	103	117	174	234	264	350	422	481	494	497	539	594	702	721	722	739
Ferrous metals and products[2]	331-32,3398-99	63	78	105	134	144	(1)	211	252	261	271	305	338	415	436	419	390
Nonferrous metals and products[2]	333-36	40	39	69	100	121	(1)	211	229	233	226	234	256	287	285	303	349
Fabricated metal products	34	97	105	129	151	243	299	297	322	342	348	414	501	545	510	542	695
Machinery	35	397	438	709	1,004	1,758	2,473	2,687	2,955	3,403	3,901	4,490	5,254	6,124	6,977	7,254	8,455
Office, computing, and accounting machines	357	(3)	(3)	(3)	(3)	(1)	(1)	1,734	1,893	2,220	2,556	2,958	3,436	3,847	4,722	5,182	6,176
Other machinery, except electrical	351-56,358-59	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	1,183	1,345	1,532	1,818	2,277	2,255	2,072	2,279
Electrical equipment	36	608	632	1,017	1,571	2,313	2,704	2,798	3,081	3,238	3,741	4,515	5,431	6,409	7,048	8,664	9,157
Radio and TV receiving equipment	365	(5)	(5)	(5)	(1)	(1)	(1)	(1)	52	85	102	192	346	358	398	388	474
Communication equipment	366	230	253	564	930	1,165	1,287	1,328	1,418	1,559	1,763	2,049	2,367	2,975	3,568	4,540	4,591
Electronic components	367					205	306	(1)	(1)	(1)	(1)	(1)	1,165	1,212	1,269	1,618	1,989
Other electrical equipment	361-64,369	378	379	453	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	1,553	1,864	1,813	2,118	2,103
Motor vehicles and motor vehicles equipment	371	517	560	799	994	1,661	2,101	2,022	2,395	2,887	3,381	3,780	4,300	4,219	4,329	4,771	5,413
Other transportation equipment	373-75,379					29	40	43	(1)	(1)	(1)	(1)	88	80	96	160	155
Aircraft and missiles	372,376	299	333	452	1,138	978	1,278	1,285	1,418	1,547	1,823	2,201	2,570	3,440	3,882	3,448	3,960
Professional and scientific instruments	38	140	157	202	353	678	908	1,001	1,168	1,350	1,668	2,012	2,456	2,978	3,396	3,805	4,250
Scientific and mechanical measuring instruments	381-82	59	63	53	67	151	211	251	309	405	560	747	1,001	1,235	1,433	1,773	2,014
Optical, surgical, photographic, and other instruments	383-87	81	94	149	286	527	697	750	859	945	1,108	1,265	1,454	1,743	1,963	2,032	2,237
Other manufacturing industries	21,27,31,39	19	33	52	88	(1)	(1)	198	212	204	266	288	339	411	493	525	569
Nonmanufacturing industries	07-17,41-67,737, 739,807,891	(1)	55	85	172	277	305	425	471	541	702	859	1,037	1,048	1,101	1,167	1,409
Less than 1,000		[6]375	[6]299	425	459	603	691	949	1,085	1,145	1,226	1,375	1,711	1,880	1,997	2,394	2,905
1,000 to 4,999		[6]406	[6]440	596	666	843	992	1,132	1,231	1,289	1,586	1,893	2,257	2,586	3,023	2,946	3,716
5,000 to 9,999		[6]2,615	[6]2,891	4,338	642	890	1,116	1,190	1,334	1,439	1,310	1,463	1,596	2,369	2,271	2,094	2,416
10,000 to 24,999					6,254	1,540	1,986	2,262	2,325	2,583	3,203	4,012	4,867	5,537	6,410	7,148	8,137
25,000 or more						7,659	9,882	10,049	11,461	12,884	14,790	16,965	20,045	23,056	25,811	28,279	30,891

Note: Company funds include all funds for industrial R&D work performed within company facilities except funds provided by the Federal Government. Excluded are company-financed research and development contracted to outside organizations such as research institutions, universities and colleges, or other nonprofit organizations.

[1] Not separately available but included in total. See general notes.
[2] SIC codes 3398 and 3399 included in the nonferrous metals and products group for 1957-63.
[3] Data not tabulated at this level prior to 1972.
[4] Data not tabulated at this level prior to 1977.
[5] Included in the other electrical equipment group.
[6] Estimated by the National Science Foundation.

SOURCE: National Science Foundation.

Table B-6. Company funds for research and development by industry and size of company: 1984

[Dollars in millions]

Industry	SIC code	Total	Companies with total employment of--				
			Less than 1,000	1,000 to 4,999	5,000 to 9,999	10,000 to 24,999	25,000 or more
Total	....	$48,065	$2,905	$3,716	$2,416	$8,137	$30,891
Food and kindred products	20	834	29	82	130	195	399
Textiles and apparel	22,23	139	(1)	25	11	57	(1)
Lumber, wood products, and furniture	24,25	181	10	44	24	(1)	(1)
Paper and allied products	26	782	(1)	62	32	249	(1)
Chemicals and allied products	28	7,802	277	814	532	2,951	3,228
Industrial chemicals	281-82,286	3,334	91	129	307	352	2,457
Drugs and medicines	283	3,401	(1)	452	125	2,299	(1)
Other chemicals	284-85,287-89	1,066	(1)	233	100	301	(1)
Petroleum refining and related industries	29	2,177	13	(1)	(1)	313	1,832
Rubber products	30	841	108	141	(1)	167	(1)
Stone, clay, and glass products	32	508	38	(1)	53	262	(1)
Primary metals	33	739	38	150	86	178	286
Ferrous metals and products	331-32,3398-99	390	17	(1)	40	76	(1)
Nonferrous metals and products	333-36	349	21	(1)	46	102	(1)
Fabricated metal products	34	695	160	111	137	97	190
Machinery	35	8,455	570	841	396	929	5,719
Office, computing, and accounting machines	357	6,176	(1)	469	(1)	286	5,026
Other machinery, except electrical	351-56,358-59	2,279	(1)	372	(1)	643	693
Electrical equipment	36	9,157	459	551	472	1,450	6,225
Radio and TV receiving equipment	365	474	39	27	(1)	(1)	(1)
Communication equipment	366	4,591	136	122	117	474	3,743
Electronic components	367	1,989	132	178	(1)	(1)	932
Other electrical equipment	361-64,369	2,103	152	225	60	(1)	(1)
Motor vehicles and motor vehicles equipment	371	5,413	16	28	23	133	5,213
Other transportation equipment	373-75,379	155	8	17	(1)	(1)	(1)
Aircraft and missiles	372,376	3,960	13	73	93	207	3,573
Professional and scientific instruments	38	4,250	441	355	141	630	2,684
Scientific and mechanical measuring instruments	381-82	2,014	276	277	(1)	(1)	(1)
Optical, surgical, photographic, and other instruments	383-87	2,237	164	78	(1)	(1)	(1)
Other manufacturing industries	21,27,31,39	569	46	148	54	165	176
Nonmanufacturing industries	07-17,41-67,737, 739,807,891	1,409	647	235	169	117	241

[1] Not separately available but included in total. See general notes.

SOURCE: National Science Foundation.

Table B-7. Company financed research and development performed by foreign subsidiaries of U.S. domestic companies outside the United States by selected industry: 1974-84

[Dollars in millions]

Industry	SIC code	1974[1]	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Total	....	$1,300	$1,454	$1,659	$1,877	$2,209	$2,754	$3,165	$3,393	$3,097	$3,276	$3,479
Food and kindred products	20	27	23	29	32	43	51	54	62	65	65	63
Chemicals and allied products	28	208	269	312	332	395	500	603	715	684	732	760
Industrial and other chemicals	281-82,284-89	82	85	108	133	151	199	245	287	313	354	357
Drugs and medicines	283	126	184	204	199	244	301	357	428	371	378	403
Petroleum refining and related industries	29	(2)	(2)	(2)	(2)	(2)	(2)	141	194	131	100	96
Stone, clay, and glass products	32	7	7	(2)	(2)	(2)	(3)	21	18	7	9	25
Primary metals	33	3	9	12	9	9	11	11	9	9	11	12
Fabricated metal products	34	(2)	(2)	22	24	29	(3)	(3)	30	25	23	21
Machinery	35	258	331	352	411	460	534	599	612	491	571	672
Electrical equipment	36	238	245	278	300	352	445	451	475	467	483	537
Electronic components	367	4	7	9	13	17	25	29	40	36	(3)	77
Other electrical equipment	361-64,369	(3)	(3)	6	5	9	11	11	39	55	61	62
Radio and TV receiving equipment; communication equipment	365-66	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
Transportation	37	406	412	464	558	640	874	1,020	884	840	874	899
Motor vehicles and other transportation equipment	371,373-75,379	364	373	423	514	(3)	(3)	(3)	(3)	(3)	(3)	(3)
Aircraft and missiles	372,376	42	39	41	44	(3)	(3)	(3)	(3)	(3)	(3)	(3)
Professional and scientific instruments	38	39	49	69	81	121	156	186	230	237	(3)	264
Other manufacturing industries	21-27,30-31,39	111	105	137	144	181	213	139	156	132	105	113
Nonmanufacturing industries	07-17,41-67,737, 739,807,891	3	4	4	9	12	5	7	8	9	16	17

Note: Data are reported in current U.S. dollars.

[1] Based on data obtained from the top 200 U.S. R&D performing companies.
[2] Included in the other manufacturing industries group.
[3] Not separately available but included in total. See general notes.

SOURCE: National Science Foundation.

Table B-8. Company funds for R&D performance by selected industry: 1984 actual and 1985 projected

[Dollars in millions]

Industry	SIC code	Actual 1984	1985 (projected)
Total	....	$48,065	$53,063
Chemicals and allied products	28	7,802	7,402
Industrial chemicals	281-82,286	3,334	2,866
Machinery	35	8,455	10,001
Electrical equipment	36	9,157	9,163
Communication equipment	366	4,591	4,404
Motor vehicles and motor vehicles equipment	371	5,413	(1)
Aircraft and missiles	372,376	3,960	4,430
All other industries	....	5,354	(1)

[1] Not separately available but included in total. See general notes.

SOURCE: National Science Foundation

Table B-9. Federal funds for research and development by industry and size of company: 1957-58, 1963, 1967, 1972, and 1974-84

[Dollars in millions]

Industry and size of company	SIC code	1957	1958	1963	1967	1972	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Total	....	$4,335	$4,759	$7,270	$8,365	$8,017	$8,220	$8,605	$9,561	$10,485	$11,189	$12,518	$14,029	$16,382	$18,483	$20,542	$23,072
Distribution by industry																	
Food and kindred products	20	(1)	6	(2)	2	1	1	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Textiles and apparel[3]	22,23	(3)	(3)	(2)	(2)	1	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Lumber, wood products, and furniture[3]	24,25	(3)	(3)	(2)	0	(2)	(2)	0	0	0	0	0	(2)	0	0	0	0
Paper and allied products	26	(1)	0	0	(2)	2	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	0	(2)	(2)
Chemicals and allied products	28	89	126	234	210	189	214	236	266	295	330	346	372	421	434	448	222
Industrial chemicals	281-82,286	80	110	146	181	171	194	218	249	281	325	345	341	409	423	440	213
Drugs and medicines	283	(1)	2	9	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Other chemicals	284-85,287-89	9	14	79	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Petroleum refining and related industries	29	11	12	21	16	15	20	(2)	32	76	121	153	151	(2)	(2)	(2)	(2)
Rubber products	30	37	21	46	22	123	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Stone, clay, and glass products	32	(2)	(2)	3	2	14	14	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Primary metals	33	5	14	10	8	12	8	21	26	44	63	95	135	176	279	392	355
Ferrous metals and products[4]	331-32,3398-99	1	2	2	1	3	(2)	3	4	23	43	70	105	(2)	(2)	(2)	(2)
Nonferrous metals and products[4]	333-36	4	12	8	6	10	(2)	17	22	21	20	25	30	(2)	(2)	(2)	(2)
Fabricated metal products	34	38	57	24	13	12	14	27	36	44	36	41	49	80	58	62	61
Machinery	35	272	343	250	322	401	511	509	532	477	382	335	647	694	857	1,131	1,215
Office, computing, and accounting machines	357	(5)	(5)	(5)	(5)	(2)	(2)	486	509	435	327	256	(2)	(2)	(2)	(2)	(2)
Other machinery, except electrical	351-56,358-59	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	42	55	79	(2)	(2)	(2)	(2)	(2)
Electrical equipment	36	1,196	1,337	1,849	2,296	2,367	2,307	2,307	2,555	2,648	2,766	3,309	3,744	3,920	4,593	5,286	5,965
Radio and TV receiving equipment	365	(7)	(7)	(7)	(2)	(2)	(2)	(2)	0	11	28	53	210	(2)	(2)	(2)	(2)
Communication equipment	366	518	615	1,209	1,495	1,417	1,137	1,057	1,093	1,166	1,236	1,586	1,657	1,783	2,182	2,572	3,124
Electronic components	367					125	104	(2)	(2)	(2)	(2)	(2)	382	361	391	346	452
Other electrical equipment	361-64,369	678	722	640	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	1,495	(2)	(2)	(2)	(2)
Motor vehicles and motor vehicles equipment	371	190	296	291	360	293	288	318	383	471	498	729	655	587	477	566	677
Other transportation equipment	373-75,379					39	47	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Aircraft and missiles	372,376	2,275	2,276	4,261	4,531	3,970	4,000	4,428	4,921	5,486	5,713	5,840	6,628	8,528	9,776	10,405	12,117
Professional and scientific instruments	38	109	137	81	189	161	167	172	163	221	330	493	573	637	623	639	660
Scientific and mechanical measuring instruments	381-82	80	93	16	37	13	10	15	15	47	110	203	350	(2)	(2)	(2)	(2)
Optical, surgical, photographic, and other instruments	383-87	29	44	65	152	148	157	157	148	174	220	290	223	(2)	(2)	(2)	(2)
Other manufacturing industries	21,27,31,39	74	72	3	(2)	(2)	(2)	7	5	39	0	0	25	(2)	(2)	(2)	(2)
Nonmanufacturing industries[3]	07-17,41-67,737,739,807,891	0	62	190	387	431	463	310	375	417	527	681	779	858	904	1,022	1,224
Distribution by size of company (based on number of employees)																	
Less than 1,000	....	167	233	194	228	326	367	273	299	208	212	389	354	424	504	599	652
1,000 to 4,999	....	226	[8]202	425	351	372	378	253	270	237	345	590	444	562	576	620	679
5,000 to 9,999	....	3,942	[8]4,324	6,651	251	186	230	288	313	390	241	228	432	619	485	754	759
10,000 to 24,999	....				7,536	619	430	371	548	835	1,075	1,179	1,150	1,225	1,406	1,868	2,195
25,000 or more	....					6,514	6,815	7,420	8,130	8,815	9,316	10,132	11,648	13,551	15,511	16,701	18,787

[1] Less than $0.5 million.
[2] Not separately available but included in total. See general notes.
[3] For 1957 and 1958 textiles and apparel and lumber, wood products, and furniture are included in the nonmanufacturing industries group.
[4] SIC codes 3398 and 3399 included in the nonferrous metals and products group for 1957-63.
[5] Data not tabulated at this level prior to 1972.
[6] Data not tabulated at this level prior to 1977.
[7] Included in the other electrical equipment group.
[8] Estimated by the National Science Foundation.

SOURCE: National Science Foundation.

Table B-10. Federal funds for research and development by industry and size of company: 1984

[Dollars in millions]

Industry	SIC code	Total	Companies with total employment of--				
			Less than 1,000	1,000 to 4,999	5,000 to 9,999	10,000 to 24,999	25,000 or more
Total	....	$23,072	$652	$679	$759	$2,195	$18,787
Food and kindred products	20	(1)	0	0	0	(1)	(1)
Textiles and apparel	22,23	(1)	(1)	(1)	0	0	0
Lumber, wood products, and furniture	24,25	0	0	0	0	0	0
Paper and allied products	26	(1)	0	0	0	(1)	(1)
Chemicals and allied products	28	222	1	(1)	(1)	18	190
Industrial chemicals	281-82,286	213	(1)	(1)	(1)	10	190
Drugs and medicines	283	(1)	0	(1)	0	(1)	0
Other chemicals	284-85,287-89	(1)	(1)	0	0	(1)	0
Petroleum refining and related industries	29	(1)	0	0	(1)	(1)	8
Rubber products	30	(1)	0	(1)	(1)	(1)	(1)
Stone, clay, and glass products	32	(1)	0	0	0	(1)	(1)
Primary metals	33	355	(1)	2	(1)	10	(1)
Ferrous metals and products	331-32,3398-99	(1)	0	(1)	(1)	(1)	(1)
Nonferrous metals and products	333-36	(1)	(1)	(1)	0	(1)	(1)
Fabricated metal products	34	61	(1)	(1)	(1)	(1)	(1)
Machinery	35	1,215	18	27	(1)	(1)	1,164
Office, computing, and accounting machines	357	(1)	(1)	0	(1)	(1)	(1)
Other machinery, except electrical	351-56,358-59	(1)	(1)	27	0	(1)	(1)
Electrical equipment	36	5,965	55	112	132	754	4,912
Radio and TV receiving equipment	365	(1)	(1)	(1)	(1)	(1)	(1)
Communication equipment	366	3,124	(1)	91	(1)	682	2,219
Electronic components	367	452	(1)	(1)	(1)	(1)	384
Other electrical equipment	361-64,369	(1)	(1)	1	(1)	(1)	(1)
Motor vehicles and motor vehicles equipment	371	677	(1)	0	(1)	(1)	(1)
Other transportation equipment	373-75,379	(1)	(1)	0	(1)	(1)	(1)
Aircraft and missiles	372,376	12,117	(1)	86	(1)	667	10,800
Professional and scientific instruments	38	660	(1)	18	(1)	(1)	511
Scientific and mechanical measuring instruments	381-82	(1)	(1)	10	0	(1)	(1)
Optical, surgical, photographic, and other instruments	383-87	(1)	(1)	9	0	(1)	(1)
Other manufacturing industries	21,27,31,39	(1)	(1)	0	0	(1)	(1)
Nonmanufacturing industries	07-17,41-67,737, 739,807,891	1,224	331	414	(1)	(1)	(1)

[1] Not separately available but included in total. See general notes.

SOURCE: National Science Foundation.

Table B-11. R&D-performing companies with 1,000 or more employees[1] and number with Federal R&D funds by industry and size of company: 1984

Industry	SIC code	Companies with total employment of--									
		1,000 or more		1,000 to 4,999		5,000 to 9,999		10,000 to 24,999		25,000 or more	
		Total	Federal	Total	Federal	Total	Federal	Total	Federal	Total	Federal
Total	....	1,278	206	775	63	185	22	191	54	127	67
Food and kindred products	20	99	2	49	0	23	0	17	1	10	1
Textiles and apparel	22,23	62	1	36	1	12	0	11	0	3	0
Lumber, wood products, and furniture	24,25	45	0	32	0	8	0	3	0	2	0
Paper and allied products	26	51	3	29	0	6	0	11	2	5	1
Chemicals and allied products	28	107	20	60	3	12	2	24	8	11	7
Industrial chemicals	281-82,286	32	14	13	2	7	2	5	3	7	7
Drugs and medicines	283	31	4	14	1	2	0	12	3	3	0
Other chemicals	284-85,287-89	44	2	33	0	3	0	7	2	1	0
Petroleum refining and related industries	29	21	11	5	0	2	1	5	3	9	7
Rubber products	30	38	7	27	2	4	1	4	2	3	2
Stone, clay, and glass products	32	36	3	19	0	6	0	9	2	2	1
Primary metals	33	75	13	47	3	10	1	11	5	7	4
Ferrous metals and products	331-32,3398-99	51	7	32	1	7	1	6	2	6	3
Nonferrous metals and products	333-36	24	6	15	2	3	0	5	3	1	1
Fabricated metal products	34	68	9	47	2	13	2	5	3	3	2
Machinery	35	169	14	119	7	17	0	21	3	12	4
Office, computing, and accounting machines	357	40	3	27	0	2	0	4	1	7	2
Other machinery, except electrical	351-56,358-59	129	11	92	7	15	0	17	2	5	2
Electrical equipment	36	144	40	89	14	20	5	19	8	16	13
Radio and TV receiving equipment	365	11	1	6	0	1	0	2	0	2	1
Communication equipment	366	32	20	16	7	4	3	6	4	6	6
Electronic components	367	35	11	22	4	5	1	4	2	4	4
Other electrical equipment	361-64,369	66	8	45	3	10	1	7	2	4	2
Motor vehicles and motor vehicles equipment	371	35	9	19	0	5	3	6	2	5	4
Other transportation equipment	373-75,379	14	3	10	0	1	1	1	0	2	2
Aircraft and missiles	372,376	31	24	11	6	2	1	6	5	12	12
Professional and scientific instruments	38	54	17	35	9	7	0	6	3	6	5
Scientific and mechanical measuring instruments	381-82	29	10	21	5	3	0	2	2	3	3
Optical, surgical, photographic, and other instruments	383-87	25	7	14	4	4	0	4	1	3	2
Other manufacturing industries	21,27,31,39	74	2	46	0	11	0	10	1	7	1
Nonmanufacturing industries	07-17,41-67,737, 739,807,891	155	28	95	16	26	5	22	6	12	1

[1] Data not available for companies with less than 1,000 employees.

SOURCE: National Science Foundation.

Table B-12. Industry-administered federally funded research and development centers--composition of work force and funds by character of work: 1983-84

[Dollars in millions]

Item	1983	1984
Total R&D funds[1]	$1,585	$1,735
Basic research	117	132
Applied research	414	547
Development	1,054	1,056
	January	
	1984	1985
Full-time-equivalent R&D scientists and engineers	8,164	8,211
	March	
	1983	1984
Total employment	24,516	25,152

[1] All of these funds were devoted to Federal R&D activities.

SOURCE: National Science Foundation.

Table B-13. R&D-performing companies in manufacturing and nonmanufacturing industries by size of company: 1984

Size of company (based on number of employees)	Number of companies reporting R&D funds		
	Total	Manufacturing	Nonmanufacturing
Total	13,778	(1)	(1)
Less than 1,000	[2]12,500	(1)	(1)
1,000 to 4,999	775	680	95
5,000 to 9,999	185	159	26
10,000 to 24,999	191	169	22
25,000 or more	127	115	12

[1] Not separately available but included in total. See general notes.

[2] Estimated by the Census Bureau based on the 1981 survey of companies with fewer than 1,000 employees. This figure is not comparable to estimates published in earlier volumes due to a change in the estimating procedure used to derive this number.

SOURCE: National Science Foundation.

Table B-14. R&D-performing companies with 1,000 or more employees[1] by size of company and R&D program: 1984

Size of company (based on number of employees)	Total	Size of R&D program [Dollars in thousands]				
		Less than $200	$200 to $999	$1,000 to $9,999	$10,000 to $99,999	$100,000 or more
Total	1,278	81	235	524	324	114
1,000 to 4,999	775	70	204	379	120	2
5,000 to 9,999	185	8	20	86	66	5
10,000 to 24,999	191	2	6	49	94	40
25,000 or more	127	1	5	10	44	67

[1] Data not available for companies with less than 1,000 employees.

SOURCE: National Science Foundation.

Table B-15. R&D-performing manufacturing companies with 5,000 or more employees by industry and percent change in R&D funds: 1983-84

Industry	SIC code	Total number of companies	10 percent or more increase	10 percent or more decrease	Less than 10 percent change
Total	....	462	221	47	194
Food and kindred products	20	51	17	4	30
Textiles and apparel	22,23	30	10	6	14
Lumber, wood products, and furniture	24,25	13	4	1	8
Paper and allied products	26	22	15	1	6
Chemicals and allied products	28	47	27	2	18
Industrial chemicals	281-82,286	19	6	2	11
Drugs and medicines	283	17	12	0	5
Other chemicals	284-85,287-89	11	9	0	2
Petroleum refining and related industries	29	16	5	1	10
Rubber products	30	16	7	2	7
Stone, clay, and glass products	32	18	10	1	7
Primary metals	33	28	10	7	11
Ferrous metals and products	331-32,3398-99	19	5	6	8
Nonferrous metals and products	333-36	9	5	1	3
Fabricated metal products	34	21	10	2	9
Machinery	35	52	28	2	22
Office, computing, and accounting machines	357	14	10	0	4
Other machinery, except electrical	351-56,358-59	38	18	2	18
Electrical equipment	36	56	36	5	15
Radio and TV receiving equipment	365	5	5	0	0
Communication equipment	366	17	10	1	6
Electronic components	367	13	11	1	1
Other electrical equipment	361-64,369	21	10	3	8
Motor vehicles and motor vehicles equipment	371	16	9	4	3
Other transportation equipment	373-75,379	4	0	1	3
Aircraft and missiles	372,376	21	11	2	8
Professional and scientific instruments	38	20	9	1	10
Scientific and mechanical measuring instruments	381-82	9	6	0	3
Optical, surgical, photographic, and other instruments	383-87	11	3	1	7
Other manufacturing industries	21,27,31,39	31	13	5	13

Note: Manufacturing companies with 5,000 or more employees are classified into those increasing 10 percent or more, those decreasing 10 percent or more, or those changing less than 10 percent based on their ratio of change for total R&D funds between 1983 and 1984.

SOURCE: National Science Foundation.

Table B-16. Percent of total, Federal, and company funds of R&D-performing companies ranked by size of R&D program: 1972, 1974-84

Companies ranked by size of R&D program (based on total R&D funds)[1]	1972	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
	Percent of total R&D funds											
First 4 (1-4)...................	18	20	20	20	20	19	20	17	18	20	19	20
Next 4 (5-8)....................	16	15	15	14	14	14	13	14	12	12	11	12
Next 12 (9-20)..................	21	21	19	20	19	19	19	18	20	19	17	17
Next 20 (21-40).................	12	11	12	12	13	13	13	13	12	13	13	13
Next 60 (41-100)................	13	15	15	15	15	15	15	15	18	16	17	17
Next 100 (101-200)..............	7	8	8	8	9	9	9	9	9	9	9	9
Next 200 (201-400)..............	6	6	6	6	6	6	6	6	6	6	6	7
	Percent of Federal R&D funds											
First 4 (1-4)...................	10	19	21	19	20	17	10	14	20	22	20	20
Next 4 (5-8)....................	32	22	23	23	23	24	27	20	18	19	20	21
Next 12 (9-20)..................	29	31	29	30	30	31	34	32	31	29	29	28
Next 20 (21-40).................	16	11	12	11	12	11	11	15	13	12	13	13
Next 60 (41-100)................	7	9	9	12	12	13	12	12	12	12	12	12
Next 100 (101-200)..............	2	4	4	3	3	4	4	4	3	4	4	4
Next 200 (201-400)..............	3	2	2	2	1	1	2	3	3	2	2	2
	Percent of company R&D funds											
First 4 (1-4)...................	24	20	19	20	20	20	24	18	18	18	20	20
Next 4 (5-8)....................	5	11	10	9	8	9	7	11	10	7	8	8
Next 12 (9-20)..................	15	13	13	13	13	13	12	12	14	15	12	12
Next 20 (21-40).................	9	11	11	12	13	13	14	12	12	14	14	14
Next 60 (41-100)................	17	17	17	17	16	16	17	17	17	17	19	19
Next 100 (101-200)..............	11	11	10	11	12	11	11	11	11	12	11	12
Next 200 (201-400)..............	8	8	8	8	8	8	8	8	8	8	8	9

[1] Companies were ranked individually for each year; therefore, particular companies comprising the size groups may have changed from year to year.

SOURCE: National Science Foundation.

Table B-17. Net sales of R&D-performing companies by industry and size of company: 1983-84

[Dollars in millions]

Industry	SIC code	1983						1984					
			Companies with total employment of--						Companies with total employment of--				
		Total	Less than 1,000	1,000 to 4,999	5,000 to 9,999	10,000 to 24,999	25,000 or more	Total	Less than 1,000	1,000 to 4,999	5,000 to 9,999	10,000 to 24,999	25,000 or more
Total	....	$1,799,194	147,045	195,500	183,413	355,281	917,957	$2,014,113	159,160	215,222	198,379	389,537	1,051,816
Food and kindred products	20	179,926	13,591	28,197	33,432	40,642	64,064	194,953	13,867	29,334	33,633	43,308	74,811
Textiles and apparel	22,23	28,981	3,418	4,972	4,503	9,293	6,795	30,740	3,698	5,437	4,856	9,801	6,947
Lumber, wood products, and furniture	24,25	21,905	1,777	6,053	(1)	(1)	(1)	25,573	2,041	7,466	(1)	(1)	(1)
Paper and allied products	26	59,160	2,503	7,996	4,310	22,270	22,081	65,470	2,736	8,121	4,814	24,937	24,862
Chemicals and allied products	28	166,290	11,415	18,768	16,133	45,772	74,203	179,944	12,452	20,631	18,393	49,673	78,795
Industrial chemicals	281-82,286	87,621	3,208	5,043	11,043	11,558	56,768	95,339	3,497	5,522	12,842	12,612	60,866
Drugs and medicines	283	37,729	(1)	4,435	2,127	21,828	(1)	40,112	(1)	4,791	2,068	23,566	(1)
Other chemicals	284-85,287-89	40,940	(1)	9,289	2,963	12,386	(1)	44,493	(1)	10,318	3,483	13,495	(1)
Petroleum refining and related industries	29	285,002	38,716	5,947	8,242	52,270	179,828	302,006	40,939	5,490	8,625	54,014	192,939
Rubber products	30	34,395	5,142	5,535	2,106	8,727	12,885	37,624	5,769	6,217	2,626	9,120	13,892
Stone, clay, and glass products	32	31,049	4,646	3,429	4,744	12,573	5,656	36,249	5,234	3,848	5,296	15,634	6,237
Primary metals	33	87,096	4,304	11,537	7,708	21,392	42,156	94,216	4,783	13,346	8,539	22,130	45,418
Ferrous metals and products	331-32,3398-99	60,416	(1)	5,882	(1)	10,609	37,563	64,780	(1)	6,977	(1)	9,938	40,328
Nonferrous metals and products	333-36	26,680	(1)	5,655	(1)	10,783	4,593	29,436	(1)	6,369	(1)	12,192	5,090
Fabricated metal products	34	40,385	7,192	6,638	9,119	7,635	7,801	44,163	7,681	9,636	10,211	8,285	8,350
Machinery	35	141,292	18,143	23,619	23,134	23,127	53,269	162,385	20,458	26,860	25,317	27,566	62,183
Office, computing, and accounting machines	357	51,685	2,927	4,464	1,081	4,469	38,743	60,796	3,361	5,672	1,082	5,130	45,551
Other machinery, except electrical	351-56,358-59	89,607	15,216	19,155	22,053	18,658	14,526	101,589	17,097	21,188	24,235	22,436	16,632
Electrical equipment	36	163,015	9,740	13,588	10,822	25,694	103,169	210,819	12,137	15,715	12,911	29,683	140,374
Radio and TV receiving equipment	365	16,776	1,052	866	(1)	(1)	(1)	19,127	1,211	1,005	(1)	(1)	(1)
Communication equipment	366	57,060	1,915	2,068	1,885	6,991	44,201	89,031	2,994	2,361	2,191	7,938	73,547
Electronic components	367	25,814	2,753	2,611	(1)	(1)	(1)	32,193	3,386	3,302	(1)	(1)	(1)
Other electrical equipment	361-64,369	63,365	4,020	8,043	5,107	9,531	36,664	70,468	4,546	9,047	5,857	10,696	40,322
Motor vehicles and motor vehicles equipment	371	131,531	1,593	3,460	3,298	9,927	113,253	170,388	2,053	4,233	4,662	12,687	146,753
Other transportation equipment	373-75,379	12,428	1,117	4,702	(1)	(1)	(1)	11,580	972	3,832	(1)	(1)	(1)
Aircraft and missiles	372,376	85,803	856	1,916	1,561	8,312	73,158	95,069	910	2,010	1,294	8,924	81,932
Professional and scientific instruments	38	47,366	6,727	5,311	2,991	5,070	27,267	52,659	7,507	6,076	3,104	5,816	30,157
Scientific and mechanical measuring instruments	381-82	19,659	3,647	2,655	(1)	(1)	9,582	23,056	4,125	3,152	(1)	(1)	11,404
Optical, surgical, photographic, and other instruments	383-87	27,707	3,080	2,656	(1)	(1)	17,685	29,603	3,381	2,924	(1)	(1)	18,756
Other manufacturing industries	21,27,31,39	59,620	4,626	9,568	6,859	11,345	27,222	67,266	5,066	11,029	7,723	12,926	30,523
Nonmanufacturing industries	07-17,41-67,737, 739,807,891	223,951	11,538	32,265	39,540	46,681	93,929	233,010	10,858	35,941	40,715	50,166	95,332

[1] Not separately available but included in total. See general notes.

SOURCE: National Science Foundation.

Table B-18. R&D funds as a percent of net sales in R&D-performing manufacturing companies by industry and size of company: 1957-58, 1963, 1967, 1972, and 1974-84

Industry and size of company	SIC code	1957	1958	1963	1967	1972	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Total		3.4	3.8	4.5	4.2	3.4	3.1	3.1	3.1	2.9	2.9	2.6	3.0	3.1	3.8	3.9	3.8
Distribution by industry																	
Food and kindred products	20	.3	.3	.4	.5	.4	.4	.4	.4	.4	.4	.4	.4	(1)	(1)	(1)	(1)
Textiles and apparel	22,23	(1)	.3	.5	.5	.4	.4	.4	.4	.4	.4	.4	.4	(1)	(1)	(1)	(1)
Lumber, wood products, and furniture	24,25	(1)	.4	.5	.3	.8	.8	.7	.7	.8	.7	.7	.8	.8	.9	.8	.7
Paper and allied products	26	.6	.7	.8	.9	.8	.8	.9	1.0	.9	.9	1.0	1.0	(1)	1.2	(1)	(1)
Chemicals and allied products	28	3.5	3.8	4.3	4.6	3.6	3.5	3.7	3.7	3.6	3.6	3.5	3.6	3.6	4.3	4.4	4.5
Industrial chemicals	281-82,286	5.0	5.4	5.1	4.8	3.9	3.3	3.6	3.7	3.5	3.5	3.2	3.3	3.2	4.0	3.9	3.7
Drugs and medicines	283	3.6	4.1	4.7	6.1	6.5	6.3	6.4	6.3	6.4	6.2	6.1	6.2	(1)	(1)	(1)	(1)
Other chemicals	284-85,287-89	1.3	1.5	2.8	2.3	1.7	1.6	1.7	1.7	1.8	1.8	1.8	1.9	(1)	(1)	(1)	(1)
Petroleum refining and related industries	29	.7	1.1	1.0	.8	.8	.6	.7	.6	.7	.7	.7	.6	(1)	(1)	(1)	(1)
Rubber products	30	1.7	1.8	2.3	1.9	2.6	2.5	2.5	2.4	2.1	1.9	1.9	2.2	(1)	(1)	(1)	(1)
Stone, clay, and glass products	32	(2)	(2)	1.6	1.8	1.7	1.7	1.2	1.2	1.3	1.3	1.3	1.4	(1)	(1)	(1)	(1)
Primary metals	33	.5	.7	.8	.8	.7	.6	.8	.8	.7	.7	.6	.7	.9	1.1	1.3	1.2
Ferrous metals and products[3]	331-32,3398-99	(1)	.6	.7	.8	.6	.5	.6	.6	.6	.6	.6	.7	(1)	(1)	(1)	(1)
Nonferrous metals and products[3]	333-36	(1)	.7	1.1	1.0	.9	1.0	1.2	1.2	1.0	.8	.7	.7	(1)	(1)	(1)	(1)
Fabricated metal products	34	1.6	1.7	1.6	1.3	1.1	1.2	1.2	1.2	1.2	1.1	1.1	1.4	1.4	1.3	1.5	1.7
Machinery	35	3.4	3.8	4.2	4.2	4.3	4.6	4.8	4.9	4.9	4.6	4.5	5.0	4.9	5.5	5.9	6.0
Office, computing, and accounting machines	357	(4)	(4)	(4)	(4)	11.1	12.6	12.0	11.6	11.5	11.1	11.0	12.0	(1)	(1)	(1)	(1)
Other machinery, except electrical	351-56,358-59	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	2.2	2.1	2.1	2.3	(1)	(1)	(1)	(1)
Electrical equipment	36	7.6	10.3	10.1	8.6	7.1	6.6	6.5	6.7	6.9	5.8	6.0	6.6	6.8	7.7	8.6	7.2
Radio and TV receiving equipment	365	(6)	(6)	(6)	1.9	1.6	1.7	1.4	1.4	1.8	1.8	2.5	4.3	(1)	(1)	(1)	(1)
Communication equipment	366	(1)	11.3	13.0	10.3	8.7	7.6	7.6	7.6	7.7	7.7	8.8	9.1	9.6	11.5	12.5	8.7
Electronic components	367					5.9	6.2	6.9	7.3	6.8	6.7	7.1	7.9	7.4	6.7	7.6	7.6
Other electrical equipment	361-64,369	(1)	9.7	7.3	7.3	6.3	6.3	6.0	6.3	5.2	5.1	4.9	4.9	(1)	(1)	(1)	(1)
Motor vehicles and motor vehicles equipment	371	2.9	4.2	3.4	3.4	3.3	3.7	3.5	3.2	3.1	3.3	3.8	4.9	4.5	4.6	4.1	3.6
Other transportation equipment	373-75,379					1.0	1.3	1.3	1.3	1.2	.8	.8	.6	(1)	(1)	(1)	(1)
Aircraft and missiles	372,376	16.8	17.7	26.7	19.7	16.6	14.1	12.7	12.7	13.3	13.3	12.9	13.7	16.0	17.7	16.2	16.9
Professional and scientific instruments	38	7.0	7.8	5.9	5.4	5.9	6.1	5.9	6.2	6.3	6.9	7.3	7.5	8.1	8.9	9.4	9.3
Scientific and mechanical measuring instruments	381-82	9.5	10.2	4.1	3.9	4.1	4.5	4.9	5.4	6.3	7.1	7.3	8.4	(1)	(1)	(1)	(1)
Optical, surgical, photographic, and other instruments	383-87	5.2	6.3	6.9	6.0	6.6	6.7	6.3	6.4	6.4	6.8	7.2	6.9	(1)	(1)	(1)	(1)
Other manufacturing industries	21,27,31,39	(1)	1.3	.7	.6	.8	.9	.8	.7	.6	.5	.4	.4	(1)	(1)	(1)	(1)
Distribution by size of company (based on number of employees)																	
Less than 1,000		[7]1.8	1.3	1.9	1.7	1.7	1.8	1.6	1.7	1.5	1.6	1.6	1.4	1.5	2.1	1.7	1.7
1,000 to 4,999		1.8	1.8	2.4	1.7	1.7	1.5	1.4	1.4	1.6	1.6	1.8	1.8	1.7	1.9	1.9	2.1
5,000 to 9,999		[7]3.9	4.8	5.3	2.1	1.9	1.8	1.8	1.9	2.0	1.4	1.3	1.4	2.1	1.7	1.8	1.8
10,000 to 24,999					5.2	1.9	1.6	1.7	1.8	1.9	1.9	1.7	1.7	1.9	2.4	2.8	2.9
25,000 or more						4.7	4.2	4.5	4.2	4.2	4.0	3.8	4.0	4.6	5.4	5.4	5.2

[1] Not separately available but included in total. See general notes.

[2] Included in other manufacturing industries group.

[3] SIC codes 3398 and 3399 included in the nonferrous metals and products group for 1957-63.

[4] Data not tabulated at this level prior to 1972.

[5] Data not tabulated at this level prior to 1977.

[6] Included in the other electrical equipment group.

[7] Separate data for companies with 5,000 or more employees and for companies with 1,000 to 4,999 employees were estimated by the National Science Foundation for 1957. Revisions of statistics by the U.S. Bureau of the Census for this year did not yield separate data for companies in these size groups.

SOURCE: National Science Foundation.

Table B-19. Company R&D funds as a percent of net sales in R&D-performing manufacturing companies by industry and size of company: 1957-58, 1963, 1967, 1972, and 1974-84

Industry and size of company	SIC code	1957	1958	1963	1967	1972	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Total	....	1.5	1.6	1.9	2.1	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.1	2.2	2.6	2.6	2.6
Distribution by industry																	
Food and kindred products	20	.3	.3	(1)	.5	.4	.4	(1)	(1)	(1)	(1)	(1)	(1)	.4	.4	.4	.4
Textiles and apparel	22,23	(1)	.2	.4	(1)	.4	(1)	(1)	(1)	(1)	(1)	(1)	(1)	.4	.5	.4	.5
Lumber, wood products, and furniture	24,25	(1)	.4	(1)	.3	(1)	(1)	.7	.7	.8	.7	.7	.8	.8	.9	.8	.8
Paper and allied products	26	.6	.7	.8	(1)	.8	(1)	(1)	(1)	(1)	(1)	(1)	1.0	1.0	1.2	1.1	1.2
Chemicals and allied products	28	3.1	3.2	3.6	4.0	3.3	3.0	3.1	3.3	3.3	3.2	3.2	3.3	3.4	4.0	4.1	4.3
Industrial chemicals	281-82,286	4.2	4.3	4.1	3.9	3.2	2.8	3.1	3.1	3.0	2.9	2.6	2.8	2.8	3.5	3.4	3.5
Drugs and medicines	283	3.6	4.0	4.5	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	6.1	6.3	7.1	7.8	8.5
Other chemicals	284-85,287-89	1.2	1.3	1.8	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	1.9	2.1	2.2	2.3	2.4
Petroleum refining and related industries	29	.7	1.1	1.2	.8	.7	.5	(1)	.6	.6	.7	.6	.5	.6	.8	.7	.7
Rubber products	30	1.1	1.4	1.6	1.7	1.7	(1)	(1)	(1)	(1)	(1)	(1)	(1)	1.9	2.2	2.2	2.2
Stone, clay, and glass products	32	(2)	(2)	1.6	1.7	1.6	1.5	(1)	(1)	(1)	(1)	(1)	1.3	1.4	1.5	1.5	1.4
Primary metals	33	.5	.6	.7	.8	.7	.5	.7	.8	.7	.6	.5	.5	.7	.8	.8	.8
Ferrous metals and products[3]	331-32,3398-99	(1)	.6	.7	.7	.6	(1)	.6	.6	.6	.5	.5	.5	.6	.7	.7	.6
Nonferrous metals and products[3]	333-36	(1)	.6	.9	.9	.9	(1)	1.1	1.1	.9	.8	.6	.6	1.0	1.2	1.1	1.2
Fabricated metal products	34	1.1	1.1	1.4	1.2	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.2	1.2	1.2	1.3	1.6
Machinery	35	2.0	2.1	3.1	3.2	3.5	3.8	4.0	4.2	4.3	4.2	4.2	4.5	4.4	4.9	5.1	5.2
Office, computing, and accounting machines	357	(4)	(4)	(4)	(4)	(1)	(1)	9.4	9.1	9.6	9.8	10.1	10.4	9.7	10.3	10.0	10.2
Other machinery, except electrical	351-56,358-59	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	2.1	2.0	2.0	2.2	2.3	2.3	2.3	2.2
Electrical equipment	36	2.6	3.3	3.6	3.5	3.5	3.5	3.6	3.7	3.4	3.4	3.6	3.9	4.2	4.7	5.3	4.3
Radio and TV receiving equipment	365	(6)	(6)	(6)	(1)	(1)	(1)	1.4	1.4	1.6	1.4	1.7	2.7	2.6	2.9	2.3	2.5
Communication equipment	366	(1)	3.3	4.2	3.9	3.9	3.9	4.2	4.3	4.4	4.5	5.0	5.4	6.0	7.1	8.0	5.2
Electronic components	367					3.7	3.9	(1)	(1)	(1)	(1)	(1)	5.9	5.7	5.1	6.3	6.2
Other electrical equipment	361-64,369	(1)	3.3	3.0	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	2.5	2.8	2.9	3.3	3.0
Motor vehicles and motor vehicles equipment	371	2.1	2.8	2.5	2.5	2.8	3.2	3.0	2.7	2.7	2.9	3.2	4.2	3.9	4.1	3.6	3.2
Other transportation equipment	373-75,379					.6	.6	.6	.6	.7	(1)	(1)	.3	.3	.6	1.3	1.3
Aircraft and missiles	372,376	2.0	2.3	2.6	4.0	3.3	3.5	2.8	2.8	2.9	3.2	3.5	3.8	4.6	5.0	4.0	4.2
Professional and scientific instruments	38	3.9	4.1	4.2	3.5	4.8	5.2	5.1	5.4	5.4	5.7	5.8	6.1	6.7	7.5	8.0	8.1
Scientific and mechanical measuring instruments	381-82	4.0	4.0	3.1	2.5	3.8	4.4	4.7	5.3	5.7	5.9	5.8	6.2	6.9	7.7	9.0	8.7
Optical, surgical, photographic, and other instruments	383-87	3.8	4.1	4.6	3.9	5.1	5.5	5.2	5.5	5.4	5.6	5.9	6.0	6.6	7.3	7.3	7.6
Other manufacturing industries	21,27,31,39	(1)	(1)	.6	(1)	(1)	(1)	.7	.7	.6	.5	.4	.4	.4	.8	.9	.9
Distribution by size of company (based on number of employees)																	
Less than 1,000	....	1.4	.7	1.5	1.6	1.5	1.6	1.4	1.5	1.5	1.4	1.5	1.2	1.4	1.8	1.4	1.5
1,000 to 4,999	....	[7]1.2	1.3	1.5	1.4	1.3	1.2	1.2	1.2	1.4	1.4	1.4	1.4	1.5	1.7	1.9	1.9
5,000 to 9,999	....	[7]1.6	1.9	2.1	1.6	1.5	1.4	1.5	1.6	1.5	1.2	1.1	1.1	1.7	1.5	1.4	1.4
10,000 to 24,999	....				2.3	1.4	1.3	1.5	1.4	1.4	1.4	1.4	1.4	1.6	2.0	2.3	2.4
25,000 or more	....					2.5	2.4	2.6	2.5	2.4	2.5	2.4	2.5	2.7	3.3	3.4	3.2

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[1] Not separately available but included in total. See general notes.
[2] Data included in other manufacturing industries group.
[3] SIC codes 3398 and 3399 included in the nonferrous metals and products group for 1957-63.
[4] Data not tabulated at this level prior to 1972.
[5] Data not tabulated at this level prior to 1977.
[6] Included in the other electrical equipment group.
[7] Estimated by the National Science Foundation.

SOURCE: National Science Foundation.

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Table B-20. R&D funds as a percent of net sales in R&D-performing manufacturing companies ranked by size of R&D program by industry: 1984

Industry	SIC code	First 4 companies	Next 4 companies	Next 12 companies
Total	....	9.0	10.7	11.0
Food and kindred products	20	1.2	.6	.7
Textiles and apparel	22,23	1.0	.5	.4
Lumber, wood products, and furniture	24,25	1.2	.7	.5
Paper and allied products	26	3.5	1.4	.5
Chemicals and allied products	28	4.8	7.1	7.1
Industrial chemicals	281-82,286	4.8	4.5	2.8
Drugs and medicines	283	13.0	8.4	7.3
Other chemicals	284-85,287-89	3.7	2.5	1.6
Petroleum refining and related industries	29	1.2	.9	.5
Rubber products	30	4.1	3.6	2.3
Stone, clay, and glass products	32	4.4	1.3	.7
Primary metals	33	1.6	1.1	1.5
Ferrous metals and products	331-32,3398-99	1.6	1.1	.6
Nonferrous metals and products	333-36	1.4	2.0	1.4
Fabricated metal products	34	4.0	1.1	2.7
Machinery	35	13.5	6.8	6.9
Office, computing, and accounting machines	357	14.0	10.3	7.8
Other machinery, except electrical	351-56,358-59	5.2	4.9	3.7
Electrical equipment	36	9.9	6.3	9.9
Radio and TV receiving equipment	365	4.9	1.0	2.5
Communication equipment	366	8.2	10.4	10.6
Electronic components	367	9.2	11.9	4.5
Other electrical equipment	361-64,369	8.7	7.7	1.6
Motor vehicles and motor vehicles equipment	371	4.0	2.7	1.1
Other transportation equipment	373-75,379	4.5	.5	.3
Aircraft and missiles	372,376	23.4	16.1	9.6
Professional and scientific instruments	38	11.3	11.5	8.7
Scientific and mechanical measuring instruments	381-82	13.5	8.0	8.0
Optical, surgical, photographic, and other instruments	383-87	9.9	8.1	3.7
Other manufacturing industries	21,27,31,39	1.0	4.0	1.0

SOURCE: National Science Foundation.

Table B-21. Company R&D funds as a percent of net sales in R&D-performing manufacturing companies ranked by size of net sales by industry: 1984

[Dollars in millions]

Industry	SIC code	Company R&D funds		Net sales		Company R&D funds as a percent of net sales	
		First 8 companies	Next 12 companies	First 8 companies	Next 12 companies	First 8 companies	Next 12 companies
Total		$12,264	$3,561	$312,119	$236,907	3.9	1.5
Food and kindred products	20	285	225	70,474	45,489	.4	.5
Textiles and apparel	22,23	61	28	12,732	7,169	.5	.4
Lumber, wood products, and furniture	24,25	115	37	14,405	5,618	.8	.7
Paper and allied products	26	531	157	33,597	19,743	1.6	.8
Chemicals and allied products	28	2,703	1,739	73,811	33,955	3.7	5.1
Industrial chemicals	281-82,286	2,413	712	68,358	19,187	3.5	3.7
Drugs and medicines	283	1,511	1,502	21,215	14,805	7.1	10.1
Other chemicals	284-85,287-89	646	163	23,382	8,532	2.8	1.9
Petroleum refining and related industries	29	1,798	364	187,656	111,962	1.0	.3
Rubber products	30	570	116	23,824	5,463	2.4	2.1
Stone, clay, and glass products	32	353	89	19,168	9,271	1.8	1.0
Primary metals	33	329	146	50,853	20,955	.6	.7
Ferrous metals and products	331-32,3398-99	211	105	45,210	11,114	.5	.9
Nonferrous metals and products	333-36	202	92	20,706	5,972	1.0	1.5
Fabricated metal products	34	280	132	17,295	9,399	1.6	1.4
Machinery	35	5,127	898	69,359	24,908	7.4	3.6
Office, computing, and accounting machines	357	4,943	752	47,775	7,099	10.3	10.6
Other machinery, except electrical	351-56,358-59	806	503	39,575	15,723	2.0	3.2
Electrical equipment	36	5,055	1,496	113,020	39,875	4.5	3.8
Radio and TV receiving equipment	365	([1])	37	([1])	975	2.3	3.8
Communication equipment	366	4,014	390	76,979	8,396	5.2	4.6
Electronic components	367	([1])	263	([1])	4,847	6.6	5.4
Other electrical equipment	361-64,369	1,546	178	47,785	9,595	3.2	1.9
Motor vehicles and motor vehicles equipment	371	5,309	69	156,082	9,670	3.4	.7
Other transportation equipment	373-75,379	140	10	9,629	1,739	1.5	.6
Aircraft and missiles	372,376	3,017	843	67,998	24,174	4.4	3.5
Professional and scientific instruments	38	2,988	472	33,274	6,845	9.0	6.9
Scientific and mechanical measuring instruments	381-82	1,461	192	15,779	2,458	9.3	7.8
Optical, surgical, photographic, and other instruments	383-87	1,951	96	22,684	3,175	8.6	3.0
Other manufacturing industries	21,27,31,39	200	176	34,563	13,791	.6	1.3

[1] Not separately available but icluded in total. See general notes.

SOURCE: National Science Foundation.

Table B-22. Percent of net sales and employment of R&D-performing companies ranked by size of R&D program: 1972, 1974-84

Companies ranked by size of R&D program (based on total R&D funds)[1]	1972	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
	Percent of net sales											
First 4 (1-4)	10	6	6	9	9	9	9	5	5	6	7	8
Next 4 (5-8)	3	5	5	3	3	3	3	4	4	4	4	4
Next 12 (9-20)	6	5	6	6	6	6	5	8	9	9	6	6
Next 20 (21-40)	7	11	10	10	10	10	11	7	7	7	10	10
Next 60 (41-100)	16	16	16	16	14	14	14	17	17	16	17	16
Next 100 (101-200)	14	14	12	11	14	14	14	12	13	15	13	13
Next 200 (201-400)	15	17	15	16	16	17	17	14	13	17	17	16
	Percent of employment											
First 4 (1-4)	9	7	7	8	8	8	9	7	7	7	7	9
Next 4 (5-8)	4	5	5	4	4	4	4	4	4	4	4	4
Next 12 (9-20)	7	6	6	7	7	7	7	7	7	7	7	7
Next 20 (21-40)	8	9	8	9	8	8	8	8	8	8	10	10
Next 60 (41-100)	12	13	13	13	13	12	12	13	12	11	12	12
Next 100 (101-200)	12	11	11	11	13	13	13	13	13	14	14	13
Next 200 (201-400)	16	16	15	16	15	15	16	14	14	18	18	18

[1] Companies were ranked individually for each year; therefore, particular companies comprising the size groups may have changed from year to year.

SOURCE: National Science Foundation.

Table B-23. Percent of total and Federal R&D funds and of net sales of R&D-performing companies ranked by size of R&D program by industry: 1984

Industry	SIC code	Percent of total R&D funds			Percent of Federal R&D funds			Percent of net sales of all R&D performing companies		
		First 4 companies	Next 4	Next 12	First 4 companies	Next 4	Next 12	First 4 companies	Next 4	Next 12
Total	....	20	12	17	20	23	28	8	4	6
Food and kindred products	20	28	17	29	0	0	71	10	11	18
Textiles and apparel	22,23	44	13	17	0	0	7	19	12	19
Lumber, wood products, and furniture	24,25	63	10	16	0	0	0	36	11	23
Paper and allied products	26	67	11	16	84	3	13	23	10	36
Chemicals and allied products	28	28	14	27	80	(1)	4	26	9	17
Industrial chemicals	281-82,286	63	18	14	84	3	10	49	14	19
Drugs and medicines	283	33	21	37	8	28	64	21	22	43
Other chemicals	284-85,287-89	52	10	17	85	0	1	34	10	25
Petroleum refining and related industries	29	56	28	16	5	93	2	35	23	23
Rubber products	30	63	16	9	96	(1)	4	43	12	11
Stone, clay, and glass products	32	64	17	11	99	1	0	25	22	25
Primary metals	33	51	12	21	92	1	6	37	12	16
Ferrous metals and products	331-32,3398-99	69	11	13	99	(1)	(1)	49	11	24
Nonferrous metals and products	333-36	49	24	24	26	2	72	45	16	22
Fabricated metal products	34	39	11	23	54	0	41	16	18	15
Machinery	35	58	9	12	89	7	(1)	26	8	11
Office, computing, and accounting machines	357	76	9	9	99	0	(1)	65	11	13
Other machinery, except electrical	351-56,358-59	36	13	14	75	4	11	16	7	9
Electrical equipment	36	47	16	20	55	19	21	34	18	15
Radio and TV receiving equipment	365	93	2	4	99	1	(1)	81	9	7
Communication equipment	366	68	18	11	59	28	12	71	15	9
Electronic components	367	60	19	12	84	6	10	50	12	21
Other electrical equipment	361-64,369	82	6	5	99	(1)	1	55	5	18
Motor vehicles and motor vehicles equipment	371	93	4	2	82	15	3	84	6	5
Other transportation equipment	373-75,379	92	4	3	98	2	(1)	50	20	26
Aircraft and missiles	372,376	54	26	18	54	27	17	38	27	31
Professional and scientific instruments	38	57	19	11	72	19	9	47	15	12
Scientific and mechanical measuring instruments	381-82	71	9	8	90	8	2	56	11	11
Optical, surgical, photographic, and other instruments	383-87	79	9	5	93	0	3	67	9	10
Other manufacturing industries	21,27,31,39	39	17	23	98	0	1	36	4	21
Nonmanufacturing industries	07-17,41-67,737, 739,807,891	25	10	14	44	18	12	5	1	9

Note: All rankings are based on total R&D funds.

[1] Less than 0.5 percent.

SOURCE: National Science Foundation.

Table B-24. Funds for basic research, applied research, and development performance: 1953-84

[Dollars in millions]

Year	Total	Basic research	Applied research	Development
1953	$3,630	$151	[1]$726	[1]$2,753
1954	4,070	166	[1]814	[1]3,090
1955	4,640	189	[1]928	[1]3,523
1956	6,605	253	1,268	5,084
1957	7,731	271	1,670	5,790
1958	8,389	295	1,911	6,183
1959	9,618	320	1,991	7,307
1960	10,509	376	2,029	8,104
1961	10,908	395	1,977	8,537
1962	11,464	488	2,449	8,527
1963	12,630	522	2,457	9,651
1964	13,512	549	2,600	10,362
1965	14,185	592	2,658	10,934
1966	15,548	624	2,843	12,081
1967	16,385	629	2,915	12,842
1968	17,429	642	3,124	13,663
1969	18,308	618	3,287	14,403
1970	18,067	602	3,427	14,038
1971	18,320	590	3,415	14,315
1972	19,552	593	3,514	15,445
1973	21,249	631	3,825	16,793
1974	22,887	699	4,288	17,900
1975	24,187	730	4,570	18,887
1976	26,997	819	5,112	21,066
1977	29,825	911	5,636	23,278
1978	33,304	[2]1,035	[2]6,300	[2]25,969
1979	38,226	[2]1,158	[2]7,225	[2]29,843
1980	44,505	[2]1,325	[2]8,450	[2]34,730
1981	51,810	[2]1,614	[2]10,699	[2]39,497
1982	57,996	[2]1,880	[2]12,175	[2]43,940
1983	63,403	2,152	13,505	47,746
1984	71,137	2,503	14,220	54,415

[1] Estimated by the National Science Foundation.

[2] National Science Foundation, National Patterns of Science and Technology Resources, 1986 (Washington, DC.: Supt. of Documents, U.S. Govenment Printing Office 1986).

SOURCE: National Science Foundation.

Table B-25. Funds for basic research, applied research, and development by industry and size of company: 1983-84

[Dollars in millions]

Industry and size of company	SIC code	1983				1984			
		Total	Basic research	Applied research	Development	Total	Basic research	Applied research	Development
Total	....	$63,403	$2,152	$13,505	$47,746	$71,137	$2,503	$14,220	$54,415
Distribution by industry									
Food and kindred products	20	(1)	34	(1)	490	(1)	55	(1)	515
Textiles and apparel	22,23	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Lumber, wood products, and furniture	24,25	169	(1)	(1)	140	181	(1)	(1)	150
Paper and allied products	26	(1)	(1)	285	349	(1)	60	330	395
Chemicals and allied products	28	7,293	(1)	(1)	3,941	8,024	677	(1)	4,348
Industrial chemicals	281-82,286	3,411	(1)	(1)	1,700	3,548	(1)	(1)	1,768
Drugs and medicines	283	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Other chemicals	284-85,287-89	(1)	(1)	(1)	(1)	(1)	39	(1)	(1)
Petroleum refining and related industries	29	(1)	(1)	(1)	971	(1)	(1)	(1)	1,041
Rubber products	30	(1)	(1)	(1)	(1)	(1)	35	(1)	(1)
Stone, clay, and glass products	32	(1)	(1)	103	371	(1)	(1)	119	419
Primary metals	33	1,115	37	235	843	1,093	61	213	819
Ferrous metals and products	331-32,3398-99	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Nonferrous metals and products	333-36	(1)	(1)	92	(1)	(1)	(1)	80	(1)
Fabricated metal products	34	604	4	148	452	756	7	183	566
Machinery	35	8,386	121	1,220	7,045	9,671	151	1,356	8,164
Office, computing, and accounting machines	357	(1)	(1)	(1)	5,182	(1)	(1)	(1)	6,142
Other machinery, except electrical	351-56,358-59	(1)	(1)	(1)	1,863	(1)	(1)	(1)	2,022
Electrical equipment	36	13,950	433	2,299	11,218	15,122	450	2,519	12,153
Radio and TV receiving equipment	365	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Communication equipment	366	7,112	305	1,037	5,770	7,715	303	1,153	6,259
Electronic components	367	1,964	(1)	(1)	(1)	2,441	(1)	(1)	(1)
Other electrical equipment	361-64,369	(1)	(1)	784	3,324	(1)	(1)	780	3,292
Motor vehicles and motor vehicles equipment	371	5,337	(1)	(1)	(1)	6,090	(1)	(1)	(1)
Other transportation equipment	373-75,379	(1)	(1)	50	196	(1)	(1)	51	192
Aircraft and missiles	372,376	13,853	146	3,466	10,241	16,076	248	3,075	12,753
Professional and scientific instruments	38	4,444	(1)	595	(1)	4,910	(1)	664	(1)
Scientific and mechanical measuring instruments	381-82	(1)	(1)	377	(1)	(1)	(1)	424	(1)
Optical, surgical, photographic, and other instruments	383-87	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Other manufacturing industries	21,27,31,39	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Nonmanufacturing industries	07-17,41-67,737, 739,807,891	2,189	(1)	655	1,282	2,633	(1)	788	1,523
Distribution by size of company (based on number of employees)									
Less than 1,000		2,992	262	392	2,338	3,557	447	677	2,433
1,000 to 4,999		3,566	267	1,359	1,940	4,395	315	1,732	2,348
5,000 to 9,999		2,848	120	981	1,747	3,175	138	1,346	1,691
10,000 to 24,999		9,017	402	3,519	5,096	10,332	490	3,237	6,605
25,000 or more		44,980	1,101	7,253	36,626	49,678	1,113	7,228	41,338

[1] Not separately available but included in total. See general notes.

SOURCE: National Science Foundation.

Table B-26. Funds for basic research, applied research, and development by industry, source of funds, and selected company size-groups: 1984

[Dollars in millions]

Industry and size of company	SIC code	Federal				Company			
		Total	Basic research	Applied research	Development	Total	Basic research	Applied research	Development
Total	....	$23,072	$545	$4,063	$18,465	$48,065	$1,958	$10,157	$35,950
Distribution by industry									
Food and kindred products	20	(1)	0	0	(1)	834	55	(1)	(1)
Textiles and apparel	22,23	(1)	0	0	(1)	139	(1)	(1)	101
Lumber, wood products, and furniture	24,25	0	0	0	0	181	(1)	(1)	150
Paper and allied products	26	(1)	0	(1)	(1)	782	(1)	(1)	(1)
Chemicals and allied products	28	222	(1)	(1)	119	7,802	673	2,900	4,229
Industrial chemicals	281-82,286	213	(1)	(1)	118	3,334	339	1,346	1,650
Drugs and medicines	283	(1)	0	(1)	0	3,401	(1)	(1)	(1)
Other chemicals	284-85,287-89	(1)	0	(1)	1	1,066	(1)	(1)	755
Petroleum refining and related industries	29	(1)	0	(1)	(1)	2,177	(1)	931	(1)
Rubber products	30	(1)	0	(1)	(1)	841	(1)	(1)	670
Stone, clay, and glass products	32	(1)	(1)	0	(1)	508	52	(1)	(1)
Primary metals	33	355	(1)	(1)	350	739	60	210	469
Ferrous metals and products	331-32,3398-99	(1)	(1)	(1)	(1)	390	(1)	(1)	249
Nonferrous metals and products	333-36	(1)	0	(1)	(1)	349	(1)	(1)	220
Fabricated metal products	34	61	0	16	45	695	7	167	521
Machinery	35	1,215	2	405	808	8,455	149	951	7,356
Office, computing, and accounting machines	357	(1)	(1)	(1)	693	6,176	(1)	(1)	5,449
Other machinery, except electrical	351-56,358-59	(1)	(1)	(1)	115	2,279	(1)	(1)	1,907
Electrical equipment	36	5,965	75	786	5,104	9,157	375	1,733	7,048
Radio and TV receiving equipment	365	(1)	0	(1)	(1)	474	(1)	(1)	(1)
Communication equipment	366	3,124	(1)	(1)	2,666	4,591	(1)	(1)	3,593
Electronic components	367	452	(1)	(1)	(1)	1,989	(1)	393	(1)
Other electrical equipment	361-64,369	(1)	4	(1)	1,705	2,103	(1)	(1)	1,587
Motor vehicles and motor vehicles equipment	371	677	(1)	(1)	(1)	5,413	(1)	(1)	(1)
Other transportation equipment	373-75,379	(1)	(1)	0	(1)	155	(1)	(1)	(1)
Aircraft and missiles	372,376	12,117	(1)	(1)	9,897	3,960	(1)	(1)	2,856
Professional and scientific instruments	38	660	(1)	(1)	(1)	4,250	(1)	(1)	3,577
Scientific and mechanical measuring instruments	381-82	(1)	(1)	(1)	(1)	2,014	(1)	(1)	1,612
Optical, surgical, photographic, and other instruments	383-87	(1)	0	(1)	(1)	2,237	(1)	(1)	1,965
Other manufacturing industries	21,27,31,39	(1)	0	(1)	(1)	569	(1)	(1)	(1)
Nonmanufacturing industries	07-17,41-67,737, 739,807,891	1,224	(1)	494	(1)	1,409	(1)	294	(1)
Distribution by size of company (based on number of employees)									
5,000 to 9,999		759	35	369	355	2,416	103	977	1,336
10,000 to 24,999		2,195	40	291	1,864	8,137	450	2,966	4,741
25,000 or more		18,787	84	2,583	16,120	30,891	1,027	4,645	25,219

[1] Not separately available but included in total. See general notes.

SOURCE: National Science Foundation.

Table B-27. Funds for basic research by industry and size of company: 1957-58, 1963, 1967, 1972, 1974-77, 1979, 1981, 1983, and 1984

[Dollars in millions]

Industry and size of company	SIC code	[1]1957	[1]1958	1963	1967	1972	1974	1975	1976	1977	1979	1981	1983	1984
Total		$271	$295	$522	$629	$593	$699	$730	$819	$911	$1,158	$1,614	$2,152	$2,503
Distribution by industry														
Food and kindred products	20	4	5	12	17	13	9	10	18	20	17	27	34	55
Textiles and apparel	22,23	1	1	1	2	2	2	(2)	(2)	(2)	(2)	1	(2)	(2)
Lumber, wood products, and furniture	24,25	0	0	0	0	(2)	(2)	3	5	7	5	(2)	(2)	(2)
Paper and allied products	26	1	(2)	2	4	4	7	5	6	9	18	32	(2)	60
Chemicals and allied products	28	82	92	152	184	214	288	294	304	337	366	539	(2)	677
Industrial chemicals	281-82,286	(2)	(2)	105	(2)	117	157	154	154	163	197	335	(2)	(2)
Drugs and medicines	283	18	21	33	45	78	107	112	119	134	143	(2)	(2)	(2)
Other chemicals	284-85,287-89	6	6	14	14	19	24	27	32	40	(2)	24	(2)	39
Petroleum refining and related industries	29	35	34	34	36	22	33	36	44	48	74	(2)	(2)	(2)
Rubber products	30	4	(2)	8	5	6	5	4	7	9	18	23	(2)	35
Stone, clay, and glass products	32	(3)	(3)	6	(2)	18	21	32	38	41	40	(2)	(2)	(2)
Primary metals	33	6	7	11	13	9	9	14	16	14	24	46	37	61
Ferrous metals and products[4]	331-32,3398-99	5	5	8	(2)	(2)	(2)	4	5	5	12	(2)	(2)	(2)
Nonferrous metals and products[4]	333-36	(2)	2	3	4	(2)	(2)	10	12	9	12	16	(2)	(2)
Fabricated metal products	34	1	1	5	3	7	3	5	2	2	4	8	4	7
Machinery	35	17	20	25	26	24	28	32	56	57	66	128	121	151
Office, computing, and accounting machines	357	(5)	(5)	(5)	(5)	(2)	(2)	26	38	41	51	(2)	(2)	(2)
Other machinery, except electrical	351-56,358-59	(6)	(6)	(6)	(6)	(6)	(6)	(6)	18	16	15	(2)	(2)	(2)
Electrical equipment	36	53	63	133	131	137	143	132	163	181	228	279	433	450
Radio and TV receiving equipment	365	(7)	(7)	(7)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Communication equipment	366	36	43	110	112	108	116	109	130	150	195	(2)	305	303
Electronic components	367					10	5	4	3	6	7	(2)	(2)	(2)
Other electrical equipment	361-64,369	17	21	23	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Motor vehicles and motor vehicles equipment	371	5	(2)	28	(2)	10	9	10	8	12	(2)	(2)	(2)	(2)
Other transportation equipment	373-75,379					(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Aircraft and missiles	372,376	25	26	59	73	62	57	54	54	55	88	128	146	248
Professional and scientific instruments	38	8	10	(2)	(2)	17	16	16	23	24	(2)	40	(2)	(2)
Scientific and mechanical measuring instruments	381-82	3	2	1	(2)	6	5	9	10	12	(2)	(2)	(2)	(2)
Optical, surgical, photographic, and other instruments	383-87	6	8	(2)	(2)	11	11	8	12	12	(2)	(2)	(2)	(2)
Other manufacturing industries	21,27,31,39	13	8	3	5	5	6	(2)	(2)	(2)	42	21	(2)	(2)
Nonmanufacturing industries	07-17,41-67,737, 739,807,891	(2)	(2)	28	52	28	26	25	29	44	57	(2)	(2)	(2)
Distribution by size of company (based on number of employees)														
Less than 1,000		(2)	(2)	(2)	56	36	34	57	68	75	98	153	262	447
1,000 to 4,999		24	32	31	45	45	47	34	52	54	69	179	267	315
5,000 to 9,999		218	240	439	50	58	88	103	118	125	158	118	120	138
10,000 to 24,999					478	90	102	96	138	168	211	229	402	490
25,000 or more						364	428	440	443	489	622	935	1,101	1,113

[1] Estimated by the National Science Foundation.
[2] Not separately available but included in total. See general notes.
[3] Data included in the other manufacturing industries group.
[4] SIC codes 3398 and 3399 included in the nonferrous metals and products group for 1957-65.
[5] Data not tabulated at this level prior to 1972.
[6] Data not tabulated at this level prior to 1975.
[7] Included in the other electrical equipment group.

SOURCE: National Science Foundation.

Table B-28. R&D-performing companies with 1,000 or more employees conducting basic research by industry: 1984

Industry and size of company	SIC code	Companies with total employment of--									
		1,000 or more		1,000 to 4,999		5,000 to 9,999		10,000 to 24,999		25,000 or more	
		R&D	Basic research	R&D	Basic research	R&D	Basic research	R&D	Basic research	R&D	Basic research
Total	....	1,278	228	775	73	185	34	191	65	127	56
Food and kindred products	20	99	17	49	3	23	5	17	5	10	4
Textiles and apparel	22,23	62	4	36	0	12	3	11	1	3	0
Lumber, wood products, and furniture	24,25	45	2	32	1	8	0	3	1	2	0
Paper and allied products	26	51	10	29	4	6	0	11	4	5	2
Chemicals and allied products	28	107	46	60	16	12	8	24	14	11	8
Industrial chemicals	281-82,286	32	18	13	5	7	5	5	2	7	6
Drugs and medicines	283	31	20	14	6	2	2	12	10	3	2
Other chemicals	284-85,287-89	44	8	33	5	3	1	7	2	1	0
Petroleum refining and related industries	29	21	11	5	1	2	0	5	4	9	6
Rubber products	30	38	8	27	1	4	2	4	2	3	3
Stone, clay, and glass products	32	36	11	19	1	6	2	9	6	2	2
Primary metals	33	75	18	47	6	10	3	11	6	7	3
Ferrous metals and products	331-32,3398-99	51	11	32	4	7	2	6	3	6	2
Nonferrous metals and products	333-36	24	7	15	2	3	1	5	3	1	1
Fabricated metal products	34	68	7	47	3	13	2	5	1	3	1
Machinery	35	169	17	119	13	17	0	21	3	12	1
Office, computing, and accounting machines	357	40	3	27	2	2	0	4	0	7	1
Other machinery, except electrical	351-56,358-59	129	14	92	11	15	0	17	3	5	0
Electrical equipment	36	144	23	89	6	20	2	19	6	16	9
Radio and TV receiving equipment	365	11	2	6	1	1	0	2	1	2	0
Communication equipment	366	32	5	16	0	4	0	6	2	6	3
Electronic components	367	35	8	22	1	5	1	4	3	4	3
Other electrical equipment	361-64,369	66	8	45	4	10	1	7	0	4	3
Motor vehicles and motor vehicles equipment	371	35	6	19	0	5	0	6	3	5	3
Other transportation equipment	373-75,379	14	3	10	1	1	1	1	0	2	1
Aircraft and missiles	372,376	31	13	11	2	2	0	6	2	12	9
Professional and scientific instruments	38	54	9	35	4	7	3	6	0	6	2
Scientific and mechanical measuring instruments	381-82	29	5	21	3	3	1	2	0	3	1
Optical, surgical, photographic, and other instruments	383-87	25	4	14	1	4	2	4	0	3	1
Other manufacturing industries	21,27,31,39	74	8	46	3	11	1	10	3	7	1
Nonmanufacturing industries	07-17,41-67,737, 739,807,891	155	15	95	8	26	2	22	4	12	1

[1] Data not available for companies with less than 1,000 employees.

SOURCE: National Science Foundation.

Table B-29. Expenditures for energy research and development by selected industry: 1972 and 1974-85

[Dollars in millions]

Industry	SIC code	1972	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	Projected 1985
Total	....	$750	$1,399	$1,774	$2,073	$2,573	$2,965	$3,643	$4,162	$4,216	$4,287	$4,396	$4,519	$4,393
Food and kindred products	20	(1)	(1)	(1)	(1)	(1)	(1)	(1)	4	5	(1)	(1)	(1)	(1)
Textiles and apparel	22,23	0	0	0	1	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Lumber, wood products, and furniture	24,25	(1)	(1)	(1)	(1)	(1)	(1)	(1)	3	4	6	6	6	7
Paper and allied products	26	(1)	(1)	(1)	(1)	1	2	3	3	2	2	2	3	3
Chemicals and allied products	28	52	71	102	121	148	157	220	257	312	346	343	189	198
Industrial chemicals	281-82,286	47	69	100	(1)	(1)	(1)	(1)	246	305	336	332	178	186
Drugs and medicines	283	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Other chemicals	284-85,287-89	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Petroleum refining and related industries	29	285	371	405	440	536	648	776	845	1,067	1,156	1,272	1,339	1,478
Rubber products	30	(1)	(1)	(1)	(1)	10	12	12	15	17	16	22	23	22
Stone, clay, and glass products	32	(1)	(1)	(1)	4	6	7	17	21	24	17	7	5	4
Primary metals	33	10	22	27	33	51	49	72	78	80	100	93	100	101
Ferrous metals and products	331-32,3398-99	(1)	(1)	(1)	12	19	14	19	20	20	22	36	37	38
Nonferrous metals and products	333-36	(1)	(1)	(1)	21	32	33	48	58	59	79	57	64	63
Fabricated metal products	34	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	60	38	48	36
Machinery	35	8	16	23	40	61	80	83	108	127	192	178	229	237
Office, computing, and accounting machines	357	(1)	(1)	(1)	(1)	(1)	(1)	13	17	6	20	(1)	(1)	(1)
Other machinery, except electrical	351-56,358-59	(1)	(1)	(1)	(1)	(1)	(1)	70	91	121	172	152	195	208
Electrical equipment	36	194	389	464	585	650	714	843	917	908	866	879	850	832
Radio and TV receiving equipment	365	0	0	0	0	0	0	0	3	(1)	5	0	0	0
Communication equipment	366	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	161	155	115	137
Electronic components	367	(1)	(1)	(1)	(1)	5	5	13	12	15	18	17	6	7
Other electrical equipment	361-64,369	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	681	707	729	687
Motor vehicles and motor vehicles equipment	371	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Other transportation equipment	373-75,379	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	2	3	2	3
Aircraft and missiles	372,376	65	142	134	110	165	283	372	446	412	346	377	571	479
Professional and scientific instruments	38	12	14	14	10	17	27	28	45	53	75	86	97	100
Scientific and mechanical measuring instruments	381,82	(1)	(1)	(1)	(1)	12	19	24	40	(1)	73	(1)	(1)	(1)
Optical, surgical, photographic, and other instruments	383-87	(1)	(1)	(1)	(1)	5	8	4	5	(1)	(1)	(1)	(1)	(1)
Other manufacturing industries	21,27,31,39	(1)	(1)	(1)	(1)	4	7	7	19	(1)	12	17	14	13
Nonmanufacturing industries	07-17,41-67,737, 739,807,891	76	100	98	137	185	220	324	333	374	385	366	446	374

[1] Not separately available but included in total. See general notes.

SOURCE: National Science Foundation.

Table B-30. Company funds for energy research and development by selected industry: 1974-84

[Dollars in millions]

Industry	SIC code	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Total	....	$857	$1,152	$1,319	$1,632	$1,796	$2,230	$2,599	$2,680	$2,798	$2,877	$3,011
Chemicals and allied products	28	(1)	(1)	(1)	(1)	(1)	(1)	(1)	149	177	164	167
Petroleum refining and related industries	29	(1)	(1)	(1)	469	530	623	699	957	1,091	1,207	1,267
Electrical equipment	36	96	115	122	165	137	219	205	203	171	180	196
Aircraft and missiles	372,376	(1)	(1)	(1)	57	68	113	163	124	88	(1)	133
All other manufacturing industries	....	(1)	(1)	(1)	(1)	(1)	(1)	(1)	1,053	1,102	(1)	1,052
Nonmanufacturing industries	07-17,41-67,737, 739,807,891	48	31	66	75	82	141	154	194	169	151	196

NOTE: Data not available for 1972.

[1] Not separately available but included in total. See general notes.

SOURCE: National Science Foundation.

Table B-31. Federal funds for energy research and development by selected industry: 1974-84

[Dollars in millions]

Industry	SIC code	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Total		$482	$622	$754	$941	$1,169	$1,413	$1,563	$1,536	$1,489	$1,519	$1,508
Chemicals and allied products	28	(1)	(1)	(1)	(1)	(1)	(1)	(1)	163	169	179	22
Petroleum refining and related industries	29	(2)	(2)	(2)	67	118	153	146	109	66	65	72
Electrical equipment	36	293	349	463	485	577	624	711	705	694	699	654
Aircraft and missiles	372,376	(2)	(2)	(2)	108	215	259	283	288	258	(1)	439
All other manufacturing industries		(2)	(2)	(2)	(2)	(1)	(1)	(1)	91	87	(1)	71
Nonmanufacturing industries	07-17,41-67,737, 739,807,891	52	67	71	110	139	183	179	180	215	215	250

NOTE: Data not available for 1972.

[1] Not separately available but included in total. See general notes.
[2] Less than $0.5 million.

SOURCE: National Science Foundation.

Table B-32. Industrial expenditures for energy research and development by primary energy source: 1973-85 (projected)

[Dollars in millions]

Primary energy source	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985 (projected)
Total	$1,009	$1,339	$1,774	$2,073	$2,573	$2,965	$3,643	$4,162	$4,216	$4,287	$4,396	$4,519	$4,393
Fossil fuels	438	516	550	605	757	843	1,063	1,228	1,437	1,491	1,591	1,633	1,717
Oil	297	329	333	381	[2]449	(1)	[2]557	(1)	[2]772	(1)	[2]905	(1)	(1)
Gas	51	74	66	68	[2]93	(1)	[2]113	(1)	[2]208	(1)	[2]255	(1)	(1)
Shale	12	18	19	24	[2]35	(1)	[2]24	(1)	[2]57	(1)	[2]48	(1)	(1)
Coal	49	65	109	127	[2]175	(1)	[2]313	(1)	[2]383	(1)	(3)	(1)	(1)
Synthetic fossil fuels	(1)	21	50	74	[2]115	(1)	[2]236	(1)	[2]210	(1)	(3)	(1)	(1)
Mining	(1)	5	9	10	[2]9	(1)	[2]1	(1)	[2]31	(1)	(3)	(1)	(1)
Other	(1)	39	50	43	[2]51	(1)	[2]76	(1)	[2]142	(1)	(3)	(1)	(1)
Other fossil fuels	29	30	23	5	[2]5	(1)	[2]56	(1)	[2]17	(1)	(3)	(1)	(1)
Nuclear	501	601	700	799	926	995	1,037	1,056	1,037	1,078	1,131	1,133	1,109
Fission	476	567	659	741	[2]844	(1)	[2]913	(1)	[2]866	(1)	[2]984	(1)	(1)
Fusion	25	34	41	58	[2]82	(1)	[2]124	(1)	[2]171	(1)	[2]147	(1)	(1)
Total geothermal, solar, conservation, and utilization	3	146	460	584	775	(1)	1,156	(1)	774	(1)	1,441	1,376	1,204
Geothermal	1	2	6	13	[2]24	(1)	[2]149	(1)	[2]71	(1)	(3)	(1)	(1)
Solar	2	7	19	43	[2]64	(1)	[2]321	(1)	[2]298	(1)	(3)	(1)	(1)
Conservation and utilization	(1)	137	435	528	[2]687	(1)	[2]686	(1)	[2]405	(1)	(3)	(1)	(1)
All other energy	67	76	64	85	[2]115	(1)	[2]387	(1)	[2]968	(1)	233	377	363

[1] Data not collected.
[2] Detailed data for 1977, 1979, 1981, and 1983 were estimated based upon (a) data actually reported in those years, (b) revised data for those years which were reported on the 1978, 1980, 1982, and 1984 survey forms, and (c) adjustments due to new sample in 1981.
[3] Not separately available, but included in total. See general notes.

SOURCE: National Science Foundation.

Table B-33. Company funds for energy research and development by primary energy source: 1974-84

[Dollars in millions]

Primary energy source	1972	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Total	(1)	$857	$1,152	$1,316	$1,632	$1,796	$2,230	$2,599	$2,680	$2,798	$2,877	$3,011
Fossil fuels	(1)	[2]503	[2]507	[2]523	644	678	788	993	1,257	1,361	1,473	1,533
Oil	(1)	[2]326	[2]327	[2]369	[3]436	(1)	[3]529	(1)	[3]746	(1)	(1)	(1)
Gas	(1)	(4)	(4)	52	[3]73	(1)	[3]109	(1)	[3](4)	(1)	(1)	(1)
Shale	(1)	(4)	(4)	(4)	[3](4)	(1)	[3](4)	(1)	[3](4)	(1)	(1)	(1)
Coal	(1)	56	77	80	[3]98	(1)	[3]130	(1)	[3]244	(1)	(1)	(1)
Synthetic fossil fuels	(1)	(4)	(4)	48	[3]64	(1)	[3]84	(1)	[3]132	(1)	(1)	(1)
Mining	(1)	(4)	(4)	7	[3]5	(1)	[3]1	(1)	[3]24	(1)	(1)	(1)
Other	(1)	33	34	25	[3]29	(1)	[3]45	(1)	[3]89	(1)	(1)	(1)
Other fossil fuels	(1)	(4)	(4)	(4)	[3](4)	(1)	[3](4)	(1)	[3](4)	(1)	(1)	(1)
Nuclear	(1)	157	160	198	217	217	169	150	126	99	91	103
Fission	(1)	[2]146	156	194	[3]211	(1)	[3]167	(1)	[3]70	(1)	[3]72	(1)
Fusion	(1)	11	4	4	[3]6	(1)	[3]2	(1)	[3]56	(1)	[3]19	(1)
Total geothermal, solar, conservation, and utilization	(1)	(4)	(4)	533	387	(1)	1,054	(1)	573	(1)	1,161	1,100
Geothermal	(1)	(4)	(4)	5	[3]9	(1)	[3]122	(1)	[3]40	(1)	(1)	(1)
Solar	(1)	(4)	(4)	17	[3]22	(1)	[3]251	(1)	[3]199	(1)	(1)	(1)
Conservation and utilization	(1)	[2]129	[2]425	[2]511	[3]656	(1)	[3]681	(1)	[3]334	(1)	(1)	(1)
All other energy	(1)	62	46	62	[3]83	(1)	[3]219	(1)	[3]724	(1)	152	275

[1] Data not collected.

[2] Revised by the National Science Foundation.

[3] Detailed data for 1977, 1979, 1981, and 1983 were estimated based upon (a) data actually reported in those years, (b) revised data for those years which were reported on the 1978, 1980, 1982, and 1984 survey forms, and (c) adjustments due to new sample in 1981.

[4] Not seperately available but included in total. See general notes.

SOURCE: National Science Foundation.

Table B-34. Federal funds for energy research and development by primary energy source: 1974-84

[Dollars in millions]

Primary energy source	1972	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Total	(1)	$482	$622	$757	$941	$1,169	$1,413	$1,563	$1,536	$1,489	$1,519	$1,508
Fossil fuels	(1)	13	[2]43	[2]82	113	165	275	235	180	130	118	100
Oil	(1)	3	6	12	[3]13	(1)	[3]29	(1)	[3]26	(1)	(4)	(1)
Gas	(1)	(4)	(4)	16	[3]20	(1)	[3]4	(1)	[3](4)	(1)	[3]10	(1)
Shale	(1)	(4)	(4)	(4)	[3](4)	(1)	[3](4)	(1)	[3](4)	(1)	[3]1	(1)
Coal	(1)	9	32	47	[3]77	(1)	[3]183	(1)	[3]139	(1)	[3]77	(1)
Synthetic fossil fuels	(1)	(4)	(4)	26	[3]51	(1)	[3]152	(1)	[3]78	(1)	(4)	(1)
Mining	(1)	(4)	(4)	3	[3]4	(1)	[3]0	(1)	[3]7	(1)	(4)	(1)
Other	(1)	6	16	18	[3]22	(1)	[3]31	(1)	[3]53	(1)	(4)	(1)
Other fossil fuels	(1)	(4)	(4)	(4)	[3](4)	(1)	[3](4)	(1)	[3](4)	(1)	[3]16	(1)
Nuclear	(1)	444	540	601	709	778	868	906	911	979	1,040	1,030
Fission	(1)	421	503	547	[3]633	(1)	[3]746	(1)	[3]796	(1)	[3]912	(1)
Fusion	(1)	23	37	54	[3]76	(1)	[3]122	(1)	[3]115	(1)	[3]128	(1)
Total geothermal, solar, conservation, and utilization	(1)	(4)	(4)	51	88	(1)	102	(1)	201	(1)	280	276
Geothermal	(1)	(4)	(4)	8	[3]15	(1)	[3]27	(1)	[3]31	(1)	(4)	(1)
Solar	(1)	(4)	(4)	26	[3]42	(1)	[3]70	(1)	[3]99	(1)	(4)	(1)
Conservation and utilization	(1)	8	10	17	[3]31	(1)	[3]5	(1)	[3]71	(1)	[3]80	(1)
All other energy	(1)	14	18	23	[3]32	(1)	[3]168	(1)	[3]244	(1)	81	102

[1] Data not collected.

[2] Revised by the National Science Foundation.

[3] Detailed data for 1977, 1979, 1981, and 1983 were estimated based upon (a) data actually reported in those years, (b) revised data for those years which were reported on the 1978, 1980, 1982, and 1984 survey forms, and (c) adjustments due to new sample in 1981.

[4] Not separately available but included in total. See general notes.

SOURCE: National Science Foundation.

Table B-35. Expenditures for pollution abatement research and development by industry: 1974-85 (projected)

[Dollars in millions]

Industry	SIC code	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985 (projected)
Total	....	$657	$647	$754	$901	$1,065	$1,249	$1,202	(1)	(1)	(1)	(1)	(1)
Food and kindred products	20	3	3	3	3	2	2	3	1	1	9	10	11
Textiles and apparel	22,23	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Lumber, wood products, and furniture	24,25	5	4	4	5	3	3	4	5	4	3	3	3
Paper and allied products	26	4	5	6	6	8	(2)	(2)	(2)	8	5	6	5
Chemicals and allied products	28	61	71	72	82	79	146	178	186	191	164	157	175
Industrial chemicals	281-82,286	39	56	58	64	67	128	157	165	172	142	138	157
Drugs and medicines	283	(2)	(2)	(2)	(2)	(2)	4	4	5	5	7	4	1
Other chemicals	284-85,287-89	(2)	(2)	(2)	(2)	(2)	13	16	15	14	16	15	16
Petroleum refining and related industries	29	61	65	58	60	71	80	95	92	97	82	89	98
Rubber products	30	0	2	2	2	3	3	3	(2)	2	1	1	1
Stone, clay, and glass products	32	7	5	4	6	7	9	11	9	7	9	10	11
Primary metals	33	13	24	31	29	25	29	30	24	22	21	21	21
Ferrous metals and products	331-32,3398-99	11	17	19	18	13	14	14	16	13	10	13	13
Nonferrous metals and products	333-36	3	7	12	12	12	15	15	9	9	11	8	8
Fabricated metal products	34	(2)	(2)	(2)	(2)	(2)	6	7	3	11	7	14	18
Machinery	35	25	23	29	32	38	31	30	34	30	29	29	30
Office, computing, and accounting machines	357	0	0	0	0	0	0	1	0	0	1	0	0
Other machinery, except electrical	351-56,358-59	25	23	29	31	37	30	29	34	30	28	29	30
Electrical equipment	36	16	19	18	20	19	34	39	39	31	29	43	49
Radio and TV receiving equipment	365	0	0	0	0	0	0	0	0	0	0	0	0
Communication equipment	366	(2)	(2)	5	6	6	5	6	(2)	(2)	(2)	(2)	(2)
Electronic components	367	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Other electrical equipment	361-64,369		(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	23	37	41
Motor vehicles and motor vehicles equipment	371	384	347	413	487	593	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Other transportation equipment	373-75,379	(2)	(2)	(2)	(2)	(2)	0	(2)	0	0	(2)	(2)	(2)
Aircraft and missiles	372,376	38	36	48	57	64	64	38	30	(2)	(2)	(2)	74
Professional and scientific instruments	38	(2)	(2)	(2)	3	4	3	(2)	(2)	(2)	3	2	1
Scientific and mechanical measuring instruments	381,82	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	1	1	1
Optical, surgical, photographic, and other instruments	383-87	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	2	1	1
Other manufacturing industries	21,27,31,39	2	1	2	3	3	2	3	(2)	(2)	2	5	7
Nonmanufacturing industries	07-17,41-67,737, 739,807,891	29	34	55	61	102	104	79	77	65	125	114	123

[1] Data not available due to high rate of imputation or because of disclosure policy.
[2] Not separately available but included in total. See general notes.

SOURCE: National Science Foundation.

Table B-37. Federal funds for pollution abatement research and development by selected industry: 1974-84

[Dollars in millions]

Industry	SIC code	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Total	....	$51	$41	$51	$57	(1)	$98	$107	$129	$122	$176	$182
Chemicals and allied products	28	(2)	(2)	15	20	(1)	36	48	58	68	66	49
Petroleum refining and related industries	29	2	1	4	6	(1)	(2)	2	0	0	0	1
Electrical equipment	36	(2)	(2)	7	8	(1)	17	20	20	12	5	8
Aircraft and missiles	372,376	21	7	11	8	(1)	(2)	12	10	(2)	(2)	(2)
All other manufacturing industries	....	(2)	(2)	12	8	(1)	(2)	6	3	(2)	(2)	(2)
Nonmanufacturing industries	07-17,41-67,737, 739,807,891	(2)	(2)	2	7	(1)	15	16	38	26	74	67

[1] Data not available for 1978.

[2] Not separately available but included in total. See general notes.

SOURCE: National Science Foundation.

Table B-36. Company funds for pollution abatement research and development by selected industry: 1974-84

[Dollars in millions]

Industry	SIC code	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Total....................................	....	$606	$606	$708	$861	(1)	$1,139	$1,095	(2)	(2)	(2)	(2)
Chemicals and allied products.....................	28	(3)	(3)	57	64	(1)	113	130	128	123	98	108
Petroleum refining and related industries........	29	59	64	59	82	(1)	(3)	93	92	97	82	88
Electrical equipment..............................	36	(3)	(3)	11	11	(1)	17	19	19	19	24	35
Aircraft and missiles.............................	372,376	13	29	37	49	(1)	(3)	26	20	22	17	24
All other manufacturing industries................	....	(3)	(3)	494	573	(1)	(3)	705	(3)	(3)	(3)	(3)
Nonmanufacturing industries.......................	07-17,41-67,737, 739,807,891	(3)	(3)	50	82	(1)	98	63	39	38	51	47

[1] Data not available for 1978.

[2] Data not available due to high rate of imputation or because of disclosure policy.

[3] Not separately available but included in total. See general notes.

SOURCE: National Science Foundation.

Table B-38. Full-time-equivalent number of R&D scientists and engineers by industry and size of company: 1957-58, 1963-64, 1967-68, and 1974-85

[In thousands]

Industry and size of company	SIC code	January																	
		1957	1958	1963	1964	1967	1968	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Total	....	229.4	234.8	327.3	340.2	367.2	376.7	360.0	363.3	364.4	382.8	404.4	423.9	450.6	487.8	509.8	522.1	544.5	570.3
Distribution by industry																			
Food and kindred products	20	3.8	4.8	5.1	5.7	6.1	6.3	6.4	6.8	6.9	6.9	6.9	7.4	7.2	7.4	7.4	7.8	7.6	(1)
Textiles and apparel	22,23	.7	.8	1.0	1.2	1.9	2.5	1.8	1.8	1.8	1.7	1.8	1.8	(1)	2.0	1.9	2.0	2.0	2.0
Lumber, wood products, and furniture	24,25	.8	.8	.5	.5	.5	.5	2.1	2.3	2.1	2.1	2.0	1.8	1.7	1.6	(1)	1.8	(1)	(1)
Paper and allied products	26	1.5	1.7	2.5	3.8	4.7	4.8	4.9	5.0	5.2	6.3	6.5	7.1	7.4	8.0	8.4	8.3	7.9	8.2
Chemicals and allied products	28	29.4	31.0	38.3	35.8	36.9	38.9	41.8	45.2	44.4	46.4	48.3	50.0	51.4	54.7	61.6	66.0	67.1	66.9
Industrial chemicals	281-82,286	18.0	18.8	22.9	22.2	21.7	22.3	19.1	21.1	20.1	20.6	21.3	21.4	20.9	21.6	25.9	27.2	26.7	25.1
Drugs and medicines	283	4.7	5.1	6.9	6.9	8.7	9.8	14.0	15.6	16.6	17.8	19.5	20.8	21.6	23.3	25.6	28.2	(1)	(1)
Other chemicals	284-85,287-89	6.7	7.1	8.5	6.7	6.5	6.8	8.7	8.5	7.8	8.0	7.5	7.8	8.9	9.8	10.1	10.6	10.3	10.9
Petroleum refining and related industries	29	6.9	7.4	8.9	8.1	8.7	9.2	8.2	8.4	8.6	8.9	9.9	10.1	10.8	13.0	15.6	14.7	13.2	13.4
Rubber products	30	4.7	4.7	5.8	6.0	5.8	6.1	7.7	8.4	8.6	9.1	7.9	8.1	(1)	10.3	8.1	(1)	(1)	(1)
Stone, clay, and glass products	32	(2)	(2)	3.8	3.3	3.3	4.1	4.5	4.5	4.6	4.5	5.1	5.2	5.4	5.6	5.1	5.0	4.6	5.2
Primary metals	33	5.1	5.2	5.2	5.1	5.9	5.9	6.4	6.3	8.1	8.4	8.1	7.9	8.1	7.9	8.4	8.4	8.5	7.5
Ferrous metals and products[3]	331-32,3398-99	2.9	3.0	2.9	2.8	3.3	3.1	3.3	3.3	3.9	3.9	4.2	4.3	4.7	4.8	5.2	5.3	5.2	4.4
Nonferrous metals and products[3]	333-36	2.2	2.2	2.3	2.3	2.5	2.7	3.1	3.0	4.2	4.5	3.9	3.6	3.4	3.1	3.2	3.1	3.3	3.1
Fabricated metal products	34	8.4	8.3	6.8	7.0	6.3	5.6	7.3	7.4	6.8	7.1	7.0	6.8	7.8	7.8	8.2	(1)	12.9	(1)
Machinery	35	24.9	27.4	31.4	27.3	33.6	37.4	51.0	52.8	55.7	55.3	57.8	60.2	62.1	69.2	76.0	76.3	75.0	77.5
Office, computing, and accounting machines	357	(4)	(4)	(4)	(4)	(4)	(4)	34.5	36.1	38.1	37.7	38.9	40.9	41.8	43.7	48.1	49.6	50.3	52.3
Other machinery, except electrical	351-56,358-59	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	18.9	19.3	20.3	25.5	27.9	26.7	24.7	25.2
Electrical equipment	36	42.9	47.9	85.8	89.5	98.6	98.4	82.6	82.6	80.3	84.1	84.4	85.0	94.5	106.9	109.8	110.3	116.1	121.5
Radio and TV receiving equipment	365	(6)	(6)	(6)	(6)	.9	1.0	1.3	1.0	1.1	.9	1.5	2.1	4.0	7.9	7.8	(1)	(1)	(1)
Communication equipment	366	19.2	22.3	55.1	60.4	66.7	67.4	42.0	40.2	37.4	38.0	39.0	40.4	42.4	44.2	45.9	47.3	56.1	56.8
Electronic components	367							9.6	10.6	10.2	13.0	14.2	14.0	18.1	22.8	24.4	24.5	(1)	26.5
Other electrical equipment	361-64,369	23.7	25.6	30.7	29.1	31.0	30.0	29.7	30.8	31.6	32.2	29.7	28.5	30.0	32.0	31.7	(1)	27.9	(1)
Motor vehicles and motor vehicles equipment	371	13.6	15.0	21.1	23.3	25.2	24.3	27.4	26.0	25.4	28.2	31.9	35.2	38.2	35.1	30.0	29.0	28.6	29.1
Other transportation equipment	373-75,379							1.8	1.9	1.7	1.9	1.9	2.0	1.5	1.4	1.2	1.9	(1)	(1)
Aircraft and missiles	372,376	58.7	58.6	90.7	101.1	100.4	101.1	70.6	67.5	66.9	72.0	82.0	86.5	85.9	95.2	91.1	95.5	96.5	108.4
Professional and scientific instruments	38	10.2	11.0	9.4	10.8	13.0	14.1	17.5	17.9	18.8	20.5	23.3	27.0	32.8	34.7	42.7	(1)	(1)	(1)
Scientific and mechanical measuring instruments	381-82	5.8	6.5	3.9	3.8	3.6	3.8	5.6	5.9	6.7	7.2	9.0	11.7	(1)	18.6	(1)	(1)	(1)	(1)
Optical, surgical, photographic, and other instruments	383-87	4.4	4.5	5.5	7.0	9.4	10	11.9	12.0	12.1	13.3	14.3	15.3	16.3	16.0	16.1	(1)	(1)	(1)
Other manufacturing industries	21,27,31,39	17.8	19.2	2.8	2.0	2.2	2.4	3.7	3.7	4.2	4.5	4.6	4.7	4.6	4.8	5.5	6.1	(1)	(1)
Nonmanufacturing industries	07-17,41-67,737,739,807,891			8.2	9.8	14.1	15.1	14.4	14.9	14.6	15.3	15.0	17.1	19.8	22.2	27.1	26.2	34.9	36.4
Distribution by size of company (based on number of employees)																			
Less than 1,000	....	44.8	48.8	34.1	32.5	27.4	27.2	28.0	30.1	30.2	31.1	29.5	30.5	34.4	38.0	40.7	42.6	53.2	53.2
1,000 to 4,999	....	22.4	24.0	35.0	34.5	30.5	29.9	28.8	29.9	29.3	28.9	27.5	30.9	34.8	38.9	42.8	44.6	44.8	47.7
5,000 to 9,999	....	162.2	171.0	258.2	273.2	24.0	24.6	26.4	27.4	26.1	28.6	28.7	30.7	29.6	27.2	36.6	29.5	29.7	32.8
10,000 to 24,999	....					285.3	295.0	45.9	47.4	50.6	49.3	52.1	55.6	64.4	71.8	77.0	83.6	82.6	85.1
25,000 or more	....							230.9	228.5	228.2	244.9	266.6	276.2	287.4	311.8	312.7	321.7	334.2	351.5

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[1] Not separately available but included in total. See general notes.
[2] Data included in the other manufacturing industries group.
[3] SIC codes 3398 and 3399 included in the nonferrous metals and products group for January 1957-64.
[4] Data not tabulated at this level prior to the 1972 survey.
[5] Data not tabulated at this level prior to the 1977 survey.
[6] Included in the other electrical equipment group.

SOURCE: National Science Foundation.

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Table B-39. Cost per R&D scientist or engineer by industry and size of company: 1957-58, 1963, 1967, 1972, and 1973-83

Industry and size of company	SIC code	1957	1958	1963	1967	1972	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Total	....	$32,700	$32,800	$37,800	$44,100.	$55,300	$63,300	$66,500	$72,200	$75,800	$80,400	$87,400	$94,900	$103,900	$112,400	$118,900	$127,600
Distribution by industry																	
Food and kindred products	20	17,200	16,800	25,200	29,500	39,500	45,200	48,900	51,400	60,100	66,000	72,300	84,900	(1)	(1)	(1)	(1)
Textiles and apparel	22,23	20,000	28,900	26,400	25,900	32,100	38,300	38,900	46,900	47,400	49,400	53,200	57,500	(1)	(1)	(1)	(1)
Lumber, wood products, and furniture	24,25	17,500	13,300	22,000	24,000	33,700	38,200	40,000	51,000	60,000	66,300	79,400	89,700	(1)	(1)	(1)	(1)
Paper and allied products	26	21,900	22,700	27,000	26,900	38,600	47,900	48,800	54,400	52,000	56,900	61,400	64,300	(1)	75,000	(1)	(1)
Chemicals and allied products	28	23,300	24,600	32,600	39,800	47,100	56,300	60,900	66,500	67,600	72,800	79,600	87,400	96,600	104,400	109,600	119,800
Industrial chemicals	281-82,286	27,400	28,400	34,800	43,900	54,000	63,500	67,500	74,700	79,600	84,200	92,800	103,400	118,000	124,300	126,600	137,000
Drugs and medicines	283	21,200	23,300	30,200	37,100	46,500	54,300	60,900	63,400	59,900	64,800	71,400	79,200	(1)	(1)	100,700	111,200
Other chemicals	284-85,287-89	14,200	15,300	27,900	29,800	33,400	45,300	43,200	50,800	53,800	61,600	66,500	66,500	(1)	(1)	(1)	(1)
Petroleum refining and related industries	29	29,500	32,600	35,400	41,500	57,100	74,900	81,500	87,200	97,700	106,000	120,800	130,400	(1)	(1)	(1)	(1)
Rubber products	30	22,800	18,700	26,500	30,600	53,100	58,300	54,900	56,700	57,800	61,600	(1)	(1)	(1)	(1)	72,200	78,600
Stone, clay, and glass products	32	(2)	(2)	26,000	36,800	43,600	48,200	51,200	57,800	59,800	62,900	67,200	73,800	(1)	(1)	(1)	(1)
Primary metals	33	21,000	24,000	35,700	41,000	44,700	55,900	61,500	61,300	65,200	70,000	79,300	91,000	107,700	119,000	132,000	136,600
Ferrous metals and products[3]	331-32,3398-99	21,700	24,600	37,400	42,200	44,200	54,800	59,700	65,600	70,100	73,900	83,300	93,300	(1)	(1)	(1)	(1)
Nonferrous metals and products[3]	333-36	20,000	23,200	33,500	41,200	44,800	57,100	63,300	57,500	60,500	65,600	74,000	87,700	(1)	(1)	(1)	(1)
Fabricated metal products	34	16,200	18,800	22,200	27,400	37,800	42,300	45,600	51,500	54,800	55,700	62,300	70,500	78,000	(1)	(1)	(1)
Machinery	35	25,600	27,500	31,000	37,400	48,000	57,500	58,900	62,800	68,600	72,600	78,900	89,900	93,900	102,900	110,900	126,800
Office, computing, and accounting machines	357	(4)	(4)	(4)	(4)	48,500	59,600	59,800	63,400	69,300	72,300	77,700	92,700	(1)	(1)	(1)	141,400
Other machinery, except electrical	351-56,358-59	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(1)	73,300	81,400	84,700	(1)	(1)	(1)	(1)
Electrical equipment	36	39,700	38,200	33,000	39,300	55,400	60,700	62,700	68,600	69,900	76,800	87,200	91,100	95,300	105,800	123,200	127,300
Radio and TV receiving equipment	365	(6)	(6)	(6)	47,400	26,700	44,300	47,600	52,000	96,000	72,200	80,300	93,400	(1)	(1)	90,300	99,000
Communication equipment	366	36,000	34,600	31,700	36,200	57,800	59,000	61,300	66,100	70,800	75,500	87,800	92,900	105,500	123,400	137,600	136,700
Electronic components	367					33,700	48,400	52,700	59,600	56,600	64,000	72,800	75,600	66,700	67,900	(1)	(1)
Other electrical equipment	361-64,369	42,800	41,900	35,400	45,800	59,700	67,700	68,000	74,700	74,200	85,100	94,900	98,300	(1)	(1)	(1)	(1)
Motor vehicles and motor vehicles equipment	371	49,400	53,800	49,400	54,700	68,100	89,500	91,100	103,700	111,700	115,600	122,900	135,200	147,400	162,900	185,300	211,100
Other transportation equipment	373-75,379					32,900	45,800	50,000	52,200	63,200	67,200	90,900	111,700	(1)	(1)	115,600	94,300
Aircraft and missiles	372,376	43,900	41,900	49,600	56,300	69,200	76,400	85,100	91,300	91,300	89,400	93,300	101,600	128,400	146,400	144,300	156,900
Professional and scientific instruments	38	23,500	25,600	29,900	40,000	53,200	60,700	63,900	66,700	71,700	79,400	83,800	89,700	93,400	(1)	(1)	(1)
Scientific and mechanical measuring instruments	381-82	22,600	23,100	18,400	28,100	32,600	38,400	42,200	46,800	55,800	64,700	(1)	(1)	(1)	(1)	75,700	80,900
Optical, surgical, photographic, and other instruments	383-87	24,700	29,100	37,500	44,500	62,800	71,500	75,300	77,900	81,100	89,700	98,400	103,800	(1)	(1)	145,200	156,600
Other manufacturing industries	21,27,31,39	(1)	(1)	23,700	39,100	40,600	47,800	51,900	51,700	53,400	57,200	61,900	77,400	(1)	(1)	85,800	89,400
Nonmanufacturing industries	07-17,41-67,737, 739,807,891	(1)	(1)	31,000	38,300	45,600	52,400	49,700	56,500	63,200	76,600	83,500	86,400	77,200	75,200	71,700	73,900
Distribution by size of company (based on number of employees)																	
Less than 1,000	....	11,600	12,000	18,600	25,200	32,400	36,400	40,500	45,200	44,700	47,900	53,500	56,300	56,600	60,000	62,500	66,900
1,000 to 4,999	....	[7]27,200	25,100	29,400	33,700	40,600	46,700	46,800	51,600	54,100	66,100	70,200	68,600	77,000	82,400	79,800	95,000
5,000 to 9,999	....	[7]39,400	38,700	41,400	36,700	38,800	50,000	55,300	60,300	61,600	52,200	56,100	71,400	93,700	83,400	96,200	101,600
10,000 to 24,999	....				45,800	48,700	51,800	53,700	57,500	63,500	79,400	84,100	86,200	90,900	97,300	108,500	123,200
25,000 or more	....					63,600	72,700	76,600	82,700	80,000	88,800	96,200	105,800	117,200	130,300	137,200	144,900

Note: The number of R&D scientists and engineers is derived by using the arithmetic mean of the full-time-equivalent of R&D scientists and engineers employed in the Januaries of two consecutive years.

[1] Not separately available but included in total. See general notes.
[2] Included in the other manufacturing group.
[3] SIC codes 3398 and 3399 included in the nonferrous metals and products group for 1957-63.
[4] Data not tabulated at this level prior to 1972.
[5] Data not tabulated at this level prior to 1977.
[6] Included in the other electrical equipment group.
[7] Estimated by the National Science Foundation.

SOURCE: National Science Foundation.

Table B-40. Cost per R&D scientist or engineer[1] by industry and size of company: 1984

Industry	SIC code	Companies with total employment of--					
		Total	Less than 1,000	1,000 to 4,999	5,000 to 9,999	10,000 to 24,999	25,000 or more
Total		$127,600	$66,900	$95,000	$101,600	$123,200	$144,900
Food and kindred products	20	(2)	70,700	96,800	108,900	(2)	(2)
Textiles and apparel	22,23	(2)	(2)	(2)	83,800	75,300	(2)
Lumber, wood products, and furniture	24,25	(2)	62,700	89,100	84,700	(2)	(2)
Paper and allied products	26	(2)	(2)	88,200	(2)	(2)	(2)
Chemicals atd allied products	28	119,800	69,400	(2)	(2)	113,400	138,200
Industrial chemicals	281-82,286	137,000	(2)	(2)	(2)	120,800	146,400
Drugs and medicines	283	111,200	(2)	(2)	(2)	(2)	(2)
Other chemicals	284-85,287-89	(2)	(2)	89,000	154,200	(2)	(2)
Petroleum refining and related industries	29	(2)	74,000	121,600	(2)	(2)	165,000
Rubber products	30	78,600	54,400	(2)	(2)	(2)	(2)
Stone, clay, and glass products	32	(2)	91,900	76,000	123,400	(2)	(2)
Primary metals	33	136,600	(2)	112,900	(2)	100,400	(2)
Ferrous metals and products	331-32,3398-99	(2)	45,400	(2)	(2)	(2)	(2)
Nonferrous metals and products	333-36	(2)	(2)	(2)	102,800	(2)	235,700
Fabricated metal products	34	(2)	(2)	(2)	(2)	(2)	(2)
Machinery	35	126,800	71,600	87,900	(2)	(2)	152,200
Office, computing, and accounting machines	357	141,400	(2)	86,500	(2)	(2)	(2)
Other machinery, except electrical	351-56,358-59	(2)	(2)	89,700	(2)	(2)	(2)
Electrical equipment	36	127,300	70,500	95,800	132,000	148,000	130,800
Radio and TV receiving equipment	365	99,000	(2)	(2)	(2)	(2)	(2)
Communication equipment	366	136,700	(2)	97,200	(2)	151,300	136,800
Electronic components	367	(2)	(2)	(2)	(2)	(2)	84,500
Other electrical equipment	361-64,369	(2)	(2)	103,300	(2)	(2)	(2)
Motor vehicles and motor vehicles equipment	371	211,100	(2)	68,900	(2)	(2)	(2)
Other transportation equipment	373-75,379	94,300	(2)	90,000	(2)	(2)	(2)
Aircraft and missiles	372,376	156,900	(2)	168,700	(2)	170,400	158,400
Professional and scientific instruments	38	(2)	(2)	84,500	(2)	(2)	110,500
Scientific and mechanical measuring instruments	381-82	80,900	(2)	78,900	(2)	(2)	(2)
Optical, surgical, photographic, and other instruments	383-87	156,600	(2)	111,000	78,100	(2)	(2)
Other manufacturing industries	21,27,31,39	89,400	(2)	85,600	100,200	(2)	(2)
Nonmanufacturing industries	07-17,41-67,737, 739,807,89.1	73,900	68,400	91,500	(2)	(2)	(2)

[1] See note on table B-39.
[2] Not separately available but included in total. See general notes.

SOURCE: National Science Foundation.

Table B-41. Cost per R&D scientist or engineer[1] in companies ranked by size of R&D program: 1972 and 1974-84

Companies ranked by size of R&D program (based on total R&D funds)	1972	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
First 4	$64,500	$80,700	$90,500	$102,500	$105,200	$109,400	$121,700	$126,700	$160,200	$182,800	$185,200	$201,100
Next 4	76,300	80,500	84,000	87,600	94,600	103,800	105,700	119,200	138,900	127,600	154,000	167,000
Next 12	63,100	76,900	80,600	82,900	79,300	83,800	90,500	93,300	107,000	127,500	119,300	120,900
Next 20	57,500	62,200	66,400	68,200	75,900	80,800	87,600	97,400	101,700	104,200	117,800	121,000
Next 60	51,000	66,200	61,400	65,200	69,900	74,200	80,100	90,700	96,400	98,000	118,800	127,200
Next 100	41,600	49,900	52,400	53,400	57,200	58,700	63,400	71,400	87,900	99,200	96,300	106,100
Next 200	39,700	44,000	43,600	48,300	54,200	56,900	61,200	72,800	79,900	86,900	86,400	94,700
Average of above 400 R&D performing companies	57,200	66,900	70,400	74,300	78,100	82,200	88,500	96,600	114,400	118,500	125,400	133,300
Average of R&D performing companies less above 400	28,300	32,800	40,100	44,000	44,900	46,200	47,400	56,300	58,600	65,100	86,600	71,000

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[1] See note on table B-39.

SOURCE: National Science Foundation.

Table B-42. Total employment of R&D-performing companies by industry and size of company: 1983-84

[In thousands]

Industry	SIC code	1983						1984					
		Companies with total employment of--						Companies with total employment of--					
		Total	Less than 1,000	1,000 to 4,999	5,000 to 9,999	10,000 to 24,999	25,000 or more	Total	Less than 1,000	1,000 to 4,999	5,000 to 9,999	10,000 to 24,999	25,000 or more
Total	....	15,229	1,369	1,746	1,298	3,040	7,776	15,722	1,352	1,765	1,311	3,062	8,252
Food and kindred products	20	1,195	98	115	178	278	525	1,158	69	110	167	273	538
Textiles and apparel	22,23	538	93	83	81	167	113	531	93	83	82	162	111
Lumber, wood products, and furniture	24,25	273	30	64	52	(1)	(1)	288	31	67	58	(1)	(1)
Paper and allied products	26	504	17	76	45	191	174	498	16	69	46	178	189
Chemicals and allied products	28	1,243	85	136	85	390	546	1,261	87	137	83	388	566
Industrial chemicals	281-82,286	596	20	32	53	76	415	615	20	34	51	77	433
Drugs and medicines	283	357	13	38	(1)	203	(1)	348	14	34	(1)	196	(1)
Other chemicals	284-85,287-89	289	51	66	(1)	112	(1)	298	53	69	(1)	116	(1)
Petroleum refining and related industries	29	622	7	15	15	101	484	621	7	14	15	95	491
Rubber products	30	399	106	63	27	72	132	413	107	64	29	77	137
Stone, clay, and glass products	32	342	51	37	(1)	146	(1)	349	50	37	(1)	154	(1)
Primary metals	33	758	43	104	75	203	333	748	43	107	73	188	337
Ferrous metals and products	331-32,3398-99	546	22	67	(1)	109	(1)	540	22	70	(1)	95	(1)
Nonferrous metals and products	333-36	212	21	37	(1)	94	(1)	208	21	37	(1)	93	(1)
Fabricated metal products	34	449	101	100	95	70	83	455	98	102	99	70	86
Machinery	35	1,495	224	261	104	277	628	1,594	236	283	110	298	667
Office, computing, and accounting machines	357	642	34	63	13	63	468	678	34	70	12	62	498
Other machinery, except electrical	351-56,358-59	853	190	198	91	214	159	917	202	213	97	236	169
Electrical equipment	36	2,173	143	177	124	296	1,433	2,455	155	191	138	305	1,665
Radio and TV receiving equipment	365	197	13	11	(1)	(1)	(1)	191	13	11	(1)	(1)	(1)
Communication equipment	366	867	29	37	26	96	679	1,095	33	39	29	99	895
Electronic components	367	361	44	44	29	67	197	401	50	52	35	56	209
Other electrical equipment	361-64,369	748	56	86	(1)	(1)	(1)	768	59	90	(1)	(1)	(1)
Motor vehicles and motor vehicles equipment	371	948	22	36	31	95	764	1,070	25	61	37	106	861
Other transportation equipment	373-75,379	163	10	27	(1)	(1)	105	134	6	20	(1)	(1)	(1)
Aircraft and missiles	372,376	906	15	20	20	89	763	954	15	21	17	91	810
Professional and scientific instruments	38	625	95	74	49	92	315	628	98	76	45	87	322
Scientific and mechanical measuring instruments	381-82	280	51	45	(1)	(1)	129	302	56		(1)	(1)	144
Optical, surgical, photographic, and other instruments	383-87	345	44	29	(1)	(1)	186	326	42	29	(1)	(1)	178
Other manufacturing industries	21,27,31,39	687	78	110	75	156	267	676	78	109	77	156	256
Nonmanufacturing industries	07-17,41-67,737, 739,807,891	1,908	150	246	184	365	963	1,888	136	235	179	358	981

[1] Not separately available but included in total. See general notes.

SOURCE: National Science Foundation.

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Table B-43. R&D scientists and engineers per 1,000 employees by industry and size of company: 1958, 1963, 1967, 1972, and 1974-84

Industry and size of company	SIC code	1958	1963	1967	1972	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Distribution by industry																
Total	....	21	28	27	24	25	26	27	27	27	27	27	29	33	35	36
Food and kindred products	20	6	7	7	7	7	7	7	7	7	6	5	6	6	6	7
Textiles and apparel	22,23	1	3	3	3	3	3	3	3	3	3	3	3	4	4	4
Lumber, wood products, and furniture	24,25	5	4	4	6	7	7	7	7	7	6	6	(1)	(1)	(1)	(1)
Paper and allied products	26	6	6	6	8	8	10	12	12	14	14	14	16	16	16	16
Chemicals and allied products	28	39	40	36	39	40	41	40	42	43	42	42	44	51	54	53
Industrial chemicals	281-82,286	42	40	33	34	37	38	36	38	38	36	36	37	44	45	42
Drugs and medicines	283	46	47	51	60	57	59	64	62	65	62	60	66	74	(1)	(1)
Other chemicals	284-85,287-89	30	38	33	31	30	29	28	29	27	27	30	33	36	36	36
Petroleum refining and related industries	29	15	17	18	16	18	19	17	17	19	18	17	20	22	22	21
Rubber products	30	19	20	17	16	17	18	18	19	18	(1)	(1)	25	(1)	(1)	(1)
Stone, clay, and glass products	32	(1)	12	14	10	11	11	11	12	13	13	13	13	14	14	14
Primary metals	33	5	5	5	5	5	7	8	8	8	7	7	8	10	11	11
Ferrous metals and products[2]	331-32,3398-99	4	4	4	4	4	5	5	5	6	6	6	6	8	10	9
Nonferrous metals and products[2]	333-36	6	8	8	7	7	11	15	13	12	12	12	13	14	15	15
Fabricated metal products	34	16	15	14	10	11	12	12	12	12	12	14	15	(1)	(1)	(1)
Machinery	35	22	28	28	31	34	36	38	38	39	38	36	35	45	51	48
Office, computing, and accounting machines	357	(3)	(3)	(3)	66	69	76	79	78	79	75	72	71	75	78	(1)
Other machinery, except electrical	351-56,358-59	(4)	(4)	(4)	(4)	(4)	(4)	(4)	18	19	19	18	19	26	30	27
Electrical equipment	36	43	55	43	37	37	40	42	42	41	43	44	48	56	52	48
Radio and TV receiving equipment	365	(5)	(5)	18	26	18	16	15	17	22	29	35	51	(1)	(1)	(1)
Communication equipment	366	52	67	52	42	43	44	45	46	48	53	55	56	73	60	52
Electronic components	367				39	40	49	55	54	51	52	55	66	67	(1)	(1)
Other electrical equipment	361-64,369	37	41	35	31	32	36	38	35	32	32	32	34	(1)	(1)	37
Motor vehicles and motor vehicles equipment	371	16	19	20	23	24	25	25	24	26	26	30	30	31	30	27
Other transportation equipment	373-75,379				14	13	13	14	13	13	11	9	9	10	(1)	(1)
Aircraft and missiles	372,376	72	99	89	76	72	72	78	85	96	93	92	98	99	106	107
Professional and scientific instruments	38	44	36	32	33	35	38	41	41	42	41	39	46	(1)	(1)	(1)
Scientific and mechanical measuring instruments	381-82	57	38	26	31	35	41	45	45	50	(1)	(1)	(1)	(1)	(1)	(1)
Optical, surgical, photographic, and other instruments	383-87	33	35	35	34	35	37	38	41	44	45	48	47	(1)	(1)	(1)
Other manufacturing industries	21,27,31,39	(1)	9	6	6	6	7	8	7	9	7	7	7	9	(1)	(1)
Nonmanufacturing industries	07-17,41-67,737, 739,807,891		9	13	21	17	16	19	16	14	13	11	12	13	16	19
Distribution by size of company (based on number of employees)																
Less than 1,000	....	18	27	28	28	29	26	25	24	25	24	25	28	30	35	39
1,000 to 4,999	....	12	19	16	19	17	17	17	17	18	18	19	21	22	26	26
5,000 to 9,999	....	25	31	15	19	18	17	19	20	17	19	19	18	23	23	24
10,000 to 24,999	....			31	16	16	17	18	19	20	19	20	23	26	27	28
25,000 or more	....				31	33	35	34	35	34	34	34	36	43	42	42

Note: The number of R&D scientists and engineers for 1983 is derived by dividing the arithmetic mean of scientists and engineers employed in January 1982 and January 1983 by the number of company employees in all activities in March 1982. Similar procedures were used in earlier years except 1967-69 in which data were derived by dividing the worker-years of R&D scientists and engineers for the year by the March employment figures.

[1] Not separately available but included in total. See general notes.
[2] SIC codes 3398 and 3399 included in the nonferrous metals products group for 1958-63.
[3] Data not tabulated at this level prior to the 1972 survey.
[4] Data not tabulated at this level prior to the 1977 survey.
[5] Included in the other electrical equipment group for 1958-63.

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SOURCE: National Science Foundation.

Table B-44. Total and company R&D funds per employee by size of company: 1963, 1967, 1972, and 1974-84

Size of company (based on number of employees)	1963	1967	1972	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
	Total R&D funds per employee													
Total............	$1,110	$1,180	$1,386	$1,624	$1,728	$1,912	$2,077	$2,240	$2,453	$2,576	$3,010	$3,719	$4,163	$4,525
Less than 1,000........	520	660	892	1,010	1,043	1,139	1,051	1,123	1,254	1,418	1,634	1,732	2,186	2,631
1,000 to 4,999.........	580	570	757	791	786	852	963	1,066	1,321	1,326	1,596	1,790	2,042	2,490
5,000 to 9,999.........	1,310	560	736	879	930	1,138	1,261	1,143	1,102	1,332	1,668	1,883	2,194	2,422
10,000 to 24,999.......		1,470	781	837	920	1,041	1,215	1,407	1,549	1,748	2,045	2,469	2,966	3,396
25,000 or more.........			1,962	2,421	2,644	2,829	2,994	3,045	3,614	3,594	4,193	5,502	5,785	6,020
	Company R&D funds per employee													
Total............	$470	$580	$818	$1,040	$1,112	$1,233	$1,347	$1,487	$1,650	$1,764	$2,059	$2,534	$2,814	$3,057
Less than 1,000........	360	420	579	657	810	893	879	933	956	1,176	1,333	1,381	1,749	2,149
1,000 to 4,999.........	340	370	525	572	642	699	790	841	910	1,108	1,311	1,503	1,687	2,105
5,000 to 9,999.........	520	420	609	729	749	921	1,004	989	987	1,048	1,323	1,551	1,613	1,843
10,000 to 24,999.......		660	557	688	791	842	927	1,077	1,237	1,414	1,675	2,025	2,351	2,675
25,000 or more.........			1,059	1,432	1,519	1,651	1,781	1,873	2,271	2,273	2,641	3,436	3,637	3,743

Note: Averages were derived by dividing total and company R&D funds for a calendar year by employment figures for March of that year.

SOURCE: National Science Foundation.

SECTION C. REPRODUCTION OF SURVEY INSTRUMENTS

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NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550

OFFICE OF THE
DIRECTOR

Dear Respondent:

The National Science Foundation requests your company's participation in the 1984 Survey of Industrial Research and Development.

This annual survey is a primary source of information necessary in evaluating this country's investment in research and development and in formulating effective public policies designed to promote and strengthen industry's role in scientific and technological innovation. In addition, company officials use the aggregate data from this survey in assessing and planning their firms' own research and development programs. Enclosed are preliminary results from the 1983 survey.

The data obtained from the survey are collected and compiled by the U.S. Bureau of the Census for the National Science Foundation. Inquiries regarding the survey should be directed to the U.S. Department of Commerce, Bureau of the Census, Washington, D. C. 20233.

The Foundation will be pleased to send your firm a copy of the published report. Requests should be sent to Thomas J. Hogan, Study Director, Industry Studies Group, Division of Science Resources Studies, Room L-602, National Science Foundation, Washington, D. C. 20550.

Thank you, in advance, for your participation in this survey.

Sincerely yours,

Erich Bloch
Director

Enclosure

RD-1-L1 (1984)
(6-8-84)

UNITED STATES DEPARTMENT OF COMMERCE
Bureau of the Census
Washington, D.C. 20233

OFFICE OF THE DIRECTOR

FROM THE DIRECTOR
BUREAU OF THE CENSUS

The Bureau of the Census conducts the "Survey of Industrial Research and Development" under sponsorship of the National Science Foundation. These measures of research and development expenditures by industry are important in analyzing and forecasting long-term economic growth, investigating productivity determinants, formulating tax policy recommendations, and comparing individual research performance against industry averages.

We are enclosing your report form and file copy for the "Survey of Industrial Research and Development During 1984" (RD-1). The changes we made to the 1984 report form include asking you to provide Federal, company, and total research and development expenditures by basic, applied, and development categories. We also added a line of data and expanded the total projected costs column to include both Federal and total expenditures for the energy research and development question. To reduce response burden, we alternate between a "long" and a "short" form every other year. We are using the "short" version for 1984.

We also are enclosing an updated instruction manual to assist you in completing the report and a letter from the National Science Foundation describing the importance of the survey results. Please read the instruction manual carefully, since it provides guidelines for reporting. We recognize that you may not maintain book records for particular items. In such cases, please use carefully prepared estimates.

The law (Title 13, United States Code) authorizes this report. Items 2A and 2B and Columns 2 and 4 of Item 5C are part of the basic statistical program of the Bureau of the Census for manufacturing companies, and reporting of these items is mandatory. Response to the remainder of the inquiries is voluntary; however, we need your cooperation to make the results of the survey comprehensive and accurate. By Section 9 of the same law (Title 13), your report to the Census Bureau is confidential. Only sworn Census Bureau employees will see the information reported and will use it only for statistical purposes. The law also provides that copies retained in your files are immune from legal process.

Please return the completed form within 60 days. Please direct requests for copies of the resulting publication or any questions concerning this survey to the Special Projects Branch of our Industry Division on (301) 763–5598. If you need additional time to complete the report or need additional forms, call (812) 288–3331. We appreciate your past cooperation in this important survey and look forward to your continued participation. Thank you.

Sincerely,

John G. Keane

JOHN G. KEANE

Enclosures

FORM **RD-1 (I)**
(10-23-84)

U.S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS
COLLECTING AND COMPILING AGENT FOR
THE NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20233

INSTRUCTIONS FOR SURVEY OF INDUSTRIAL RESEARCH AND DEVELOPMENT DURING 1984

Outline of instructions

GENERAL Page

Information about reporting 1
Companies reporting in survey for the first time 1
Preposted figures 2
Revision of figures 2
Coverage — reported unit, period 2

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Item 2 — Sales and Employment for Company 2

DEFINITION OF RESEARCH AND DEVELOPMENT 2

Section II — RESEARCH AND DEVELOPMENT PERFORMED WITHIN THE COMPANY IN THE UNITED STATES 3
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Cost or Receipts for Research and Development Performed Within the Company by Major Type and Source of Funds 3
Item 5 — Basic, Applied, and Development 4
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Item 7 — Total Company Funds Spent for Research and Development Activties Performed by Foreign Affiliates Outside the United States 4

GENERAL

Estimates are Acceptable — Reporting on this form may require using informed estimates in answering some of the questions. These estimates are satisfactory if they are sufficient to develop both meaningful totals and, especially, measures of change from year to year. Direct any questions regarding this form to the Bureau of the Census, ATTN: Industry Division, Washington, D.C. 20233, or call (301) 763—5598.

Companies Reporting in Survey for the First Time — Companies which did not report in the 1983 survey are asked to provide figures for both 1983 and 1984. If the company had no expenditures for research and development, complete only Item 2. Enter "No R&D" in the space for remarks on page 2 of the form, sign, and return the form.

Figures for Earlier Years are Preposted on the Form — If your company reported for 1983, entries from that form have been copied on the present form.

Please describe in the "Remarks" section (page 2 of the form) the reasons for any substantial increases or decreases in the 1984 figures entered on this form when compared to corresponding 1983 figures. Examples of such reasons are new government contracts, acquisitions, and divestitures revised accounting method, etc. If you acquired or disposed of a unit performing an important amount of research and development during the 2-year period, please identify the unit in remarks, and give the total amount of research and development accounted for by such unit.

Revision of Earlier Year Figures — The 1983 figures should be revised if necessary to assure comparability with 1984 data. Please explain in remarks, any significant change made in the 1983 figures. If your company did not report for 1983, or if no entries have been entered in the 1983 column, fill in the figures for both years.

GENERAL — Continued

Report for Your Entire Company — Research and development (R&D) activities for your entire domestic company should be reported, including all subsidiaries, divisions, etc.

Period Covered by Report — The figures reported should cover the calendar year if possible. Fiscal year data, however, are acceptable for all items except employment, provided your fiscal year ends between September and March. Please report employment figures (Item 2B and Item 4) for the specific period identified in each of the items mentioned.

Geographic Area Covered — The data relate to business firms which operate one or more establishments in one or more of the 50 States or the District of Columbia.

▶ Section I — GENERAL COMPANY DATA

▶ Item 1 — Name and Address of Company

▶ Item 2 — Sales and Employment for Company

Item 2A — Net Sales — Report the net sales and receipts of this company and its subsidiaries to customers outside the company. (Exclude domestic intra-company transfers and sales by foreign subsidiaries; include, however, transfers to such foreign subsidiaries as well as export sales to foreign companies.) The reported figures should represent value f.o.b. plant after discounts and allowances and should exclude freight charges and excise taxes.

Item 2B — Employment— Report the number of persons employed at the company in all activities in the 50 States or the District of Columbia during the pay period which includes March 12 of 1983 and 1984. This figure would be the same as that shown by the company in Item 14 of Treasury Form 941, if the company filed one Form 941 for the entire company.

▶ Item 3 — RESEARCH AND DEVELOPMENT EXPENDITURES

Definition of Research and Development — Research and development includes basic and applied research in the sciences and in engineering, and design and development of prototype products and processes. For the purposes of this questionnaire, research and development includes activities carried on by persons trained, either formally or by experience, in the physical sciences including related engineering, and the biological sciences including medicine but excluding psychology, if the purpose of such activity is to do one or more of the following things:

1. Pursue a planned search for new knowledge, whether or not the search has reference to a specific application.

2. Apply existing knowledge to problems involved in the creation of a new product or process, including work required to evaluate possible uses.

3. Apply existing knowledge to problems involved in the improvement of a present product or process.

Research and development includes the activities described above whether assigned to separate research and development organizational units of the company or carried on by company laboratories and technical groups not part of an R&D organization. The reporting of activities of such latter groups may require the use of estimates for some of the questions.

Activities to be Excluded From Research and Development — Research and development for purposes of this survey excludes capital expenditures, routine product testing, research in the social sciences or psychology, or other nontechnological activities or technical services. Please exclude geological and geophysical exploration activities; include, however, the research and development conducted in support of such activities, such as the development or improvement of techniques and processes.

More specifically, exclude from research and development such nontechnological activities as market research, including statistical surveys, market development, economic research, and legal work in connection with patent applications and litigation, and the sale of licensing of patents.

Also exclude from research and development such technical services as: quality and quantity control tests and analyses; troubleshooting in connection with breakdowns in full-scale production, including related analytical work; technical plant sanitation control; work required for minor adaptations of a specific product to meet the requirements of a specific customer, including installation and servicing in a customer's plant; engineering and other technical services furnished in accordance with agreements to licensees outside the company; aid furnished by the R&D organization to manufacturing divisions to enable them to operate in accordance with previously determined formulas, standard practice instructions, or finished product specifications; aid furnished to develop advertising programs and to promote or demonstrate new products or processes, including the cost of material furnished for trial or demonstration; assistance in preparation of speeches and publications for persons not engaged in research and development; and experimental work performed at the request of the patent division to provide information needed during the prosecution of a patent litigation.

▶ Section II — RESEARCH AND DEVELOPMENT PERFORMED WITHIN THE COMPANY IN THE UNITED STATES

▶ Item 4 — Research and Development Scientists and Engineers — Scientists and engineers for this survey are defined as all persons engaged in scientific or engineering work at a level which requires a knowledge of physical or life sciences or engineering or mathematics, equivalent at least to that acquired through completion of a four-year college course with a major in these fields, regardless of whether they held a college degree in the field.

▶ Item 4 — Research and Development Scientists and Engineers — Continued

The figure on R&D scientists and engineers will be obtained primarily from two sources:

1. Records on the number of scientists and engineers assigned to research and development. This source is satisfactory as long as the scientists and engineers of the unit are assigned to research and development on a full-time basis (i.e., no more than 5 percent of their time is spent on nonresearch and development). For example, for company laboratories performing only research and development, report the number of scientists and engineers on the rolls in January. For other units, use source 2.

2. Figures on the proportion of total work time of scientists and engineers that is devoted to research and development. For example, if the engineering department of a manufacturing plant had 60 scientists and engineers in January 1984 and one-fourth of the scientists' and engineers' time during that month was charged to R&D projects, the figure for the number of R&D scientists and engineers included for that unit would be 15.

Separate figures are requested on the number of scientists and engineers working on Federal and company and other R&D projects. Where R&D work for the Government and for the company is performed by the same group of scientists and engineers, distribute the total number of such scientists and engineers according to the program, Federal or company, for which the R&D work was performed.

▶ **Item 5 — Cost or Receipts for Research and Development Performed Within the Company by Major Type and Source of Funds** — Include all costs incurred to support research and development including depreciation and overhead but excluding capital expenditures. If you perform research and development for others on contract, include the total charged for the work performed, including profit.

The relevant costs usually include but are not limited to the elements listed below:

1. Wages, salaries, and related costs. Materials and supplies consumed (or purchased, if consumption figures are not available); costs of computer software used in activities; utilities, such as telephone, telex, electricity, water, gas, and fuel; books and periodicals; travel and entertainment costs and professional dues.

2. Property taxes and other taxes (except income taxes) incurred on account of the R&D organization or the facilities which the R&D organization uses; insurance expense; maintenance and repair, including the maintenance of buildings and grounds; depreciation on buildings, equipment, and vehicles; and rentals, if any facilities are leased.

3. Company overhead. Estimate a fair share of the cost of any functions which support activities. The basis and method of estimating overhead costs will depend upon company practice. Be sure that all companies include an allowance for overhead. Items normally covered in overhead include the following: Personnel; accounting; procurement and inventory, including purchasing, storage, transportation, control, and of materials and supplies; other services, including legal, public relations, duplicating, maintenance of motor vehicles, stenographic service, salaries and related costs of research executives not on the payroll of the research and development organization.

Include in R&D expenditures the full cost of all research and development performed; do not net your R&D expenditures by the amount of royalties received from either non-company organizations or company units, or the credits received for R&D work charged or "sold" to other units of reporting company or to outside organizations.

Types of Expense to be Excluded From The Cost of Research and Development Performed Within The Company — Exclude capital expenditures, royalties paid, patent expense, income taxes, or interest; the cost of research and development performed for the company by noncompany R&D organizations of any kind; and income from sale of products manufactured in the R&D organization if these were sold to bonafide customers. Also exclude the portion of company-held R&D contracts which were subcontracted to R&D organizations outside the reporting company. (All work that was done for your laboratories and other technical units by noncompany organizations which are not R&D organizations — for example, model construction by a noncompany model shop — is to be considered as a **purchase** of equipment, material, or supplies for the company research organization rather than as subcontracted research and development.) Exclude fellowships, grants, and gifts to promote research and development or the study of science and engineering.

Methods of Estimating Research and Development Expenditures by Type — (Basic, Applied, and Development) — If your company does not keep records that meet or can be allocated to these specific categories, estimate by:

1. Isolating the **projects** that clearly fall in the development category. If your company fabricates products, such development activity will include the design, construction, and testing of prototypes and models. Some defense contracts typically call for several test models. If your company's research and development frequently involves the development of a "process" as in chemicals and petroleum, such development activity would include operations beyond the bench scale, primarily the design and operations of pilot plants or semiworks.

2. Isolating the **organizational units** which have R&D activities that can be readily classified.

3. Distributing the **balance** on the basis of a review of individual projects or on the basis of other summaries of the work. Please use the definitions for basic, applied, and development, as given below.

Item 5A — Basic Research — Include the cost of research projects which represent original investigation for the advancement of scientific knowledge and which do not have specific commercial objectives, although they may be in the fields of present or potential interest to the reporting company.

Item 5B1 — Applied Research — Include the cost of research projects which represent investigation directed to discovery of new scientific knowledge and which have specific commercial objectives with respect to either products or processes. Note that the chief difference between this definition of applied research and the definition of basic research is in terms of the objectives of the reporting company.

Item 5B2 — Development — Include the cost of projects which represent technical activity concerned with nonroutine problems encountered in translating research findings or other general scientific knowledge into products or processes. Exclude routine technical services to customers or other items excluded from the definition of total research and development in Section I above.

Types of Activity Included in Development — Include the design and operation of pilot plants or semiworks plants as long as the principal purposes are to obtain experience and to compile engineering and other data to be used in evaluating hypotheses, in writing product formulas, or in establishing finished product specifications, in designing special equipment and structures required by a process, and in preparing operating instructions or manuals. Also include the engineering activity required to advance the design of a product or a process to the point where it meets specific functional and economic requirements and can be turned over to manufacturing units; and further improvements on the products or processes, include the design, construction, and testing of preproduction prototypes and models and "engineering follow-through" in the early production phase; the development of designs for special manufacturing equipment and tools; the preparation of reports, drawings, formulas, specifications, standard practice instructions or operating manuals, and other media for transmitting to operating units information obtained from the above activities.

Types of Activity Excluded from Development — Exclude toolmaking and tool tryout; production of detailed construction drawings and manufacturing blueprints; work to develop markets; preproduction planning; work to smooth the production process.

Source of Funds — Federal and Company

Definitions of "Federal" and of "Company and Other"

Item 5, Column 2 — Federal — Include the cost of work done on Federal R&D contracts or subcontracts, and the R&D portions of procurement contracts and subcontracts during the year.

Do not include here, or elsewhere in the report, research and development contracts and the portions of procurement contracts that you subcontracted to other organizations. To do so would cause duplication in the statistical totals derived from these forms, which report work actually performed.

Item 5, Column 3 — Company and Other — Include the cost of all company-sponsored research and development performed within the company as well as the research and development your company performed under contract from non-Federal sources. Exclude the research and development that was sponsored by your company but performed outside the company.

Item 5E — Report the expected or estimated cost of company-sponsored research and development that will be performed within the company within the 50 States and the District of Columbia during 1985.

Item 6 — Research and Development by Functional Category

Items 6A to 6E — Energy Research and Development — Include all spending for research and development to increase energy resources or capabilities, including the development of energy equipment. If R&D spending is for joint or multiple purposes, estimate and report the portion of cost incurred for the energy purpose. Do not include any of the project costs if the **primary** purpose of the project is other than energy R&D. Energy R&D can include costs of R&D projects (both product and process) on exploration, extraction, transportation, processing, storage, generation (including conversion), distribution, conservation, etc., of present, new, or improved forms of energy. Record energy R&D spending according to type of energy.

Item 6C — "Conservation and Utilization" includes R&D activities undertaken to reduce consumption either at the point of energy use or in the transmission, transportation, storage, and conversion of energy. Examples of such are research and development undertaken primarily to reduce fuel consumption in manufacturing, to improve the efficiency of transportation of energy products, or to produce an end product which is more efficient in energy consumption.

Item 6D — "All Other Energy" includes areas such as wind, waste, hydroelectric, etc. Also include in this category the development of energy equipment which cannot be readily classified in Items 6A to 6C. In a limited number of cases, the separation of joint (multiple) costs by type of energy may not be feasible. In this circumstance, include here the total project cost if the **primary** purpose of a project is energy research and development.

Item 6F — Pollution Abatement Research and Development — Include R&D spending for the purpose of reducing or eliminating the emission of pollutants. "Pollution" refers to the emission of pollutants to the outside of a firm's (or household 's) property or activities; "abatement" includes prevention, treatment or recycling. Exclude spending to contribute to environmental aesthetics, to increase equipment durability in corrosive environments, to conserve energy (include as energy research and development in Item 6C) and natural resources, or to increase employee comfort, safety, and health.

If the purpose of the R&D project is pollution abatement only, include the total expenditures on the R&D project. If the project has mixed purposes, estimate and report where possible only the portion of costs incurred for the pollution abatement purpose. If a separation of joint costs cannot be made, then decide whether the R&D project is primarily (more than 50 percent) for pollution abatement. If so, then include the total cost of the project. If the project **is not** primarily for pollution abatement, then exclude all of the project cost. Exclude project costs if expected pollution abatement benefits are incidental. (Incidental benefits are those obtained at no extra cost.)

Item 7 — Total Company Funds Spent for Research and Development Activities Performed by Foreign Subisiaries Outside the United States — Report the amount of research and development that was performed in company R&D laboratories, branch plants, and divisions located outside the United States and was **financed by the U.S. parent or its foreign subsidiaries;** exclude the R&D activities performed in foreign subsidiaries that were financed by foreign governments or other outside organizations. NOTE: Foreign subsidiaries are those outside the 50 States or the District of Columbia.

Additional forms — Photocopies of this form are acceptable. If you require additional copies of the form, write to the Census Bureau, 1201 East Tenth Street, Jeffersonville, Indiana 47132.

DUE DATE: 60 DAYS AFTER RECEIPT OF FORM OMB No. 3145-0027: Approval Expires July 31, 1987

FORM **RD-1**
(8-14-84)

U.S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS
COLLECTING AND COMPILING AGENT FOR
THE NATIONAL SCIENCE FOUNDATION

SURVEY OF INDUSTRIAL RESEARCH AND DEVELOPMENT DURING 1984

RETURN TO
Bureau of the Census
1201 East Tenth Street
Jeffersonville, Indiana 47132

Name of person who supplied 1983 data

NOTE: Data supplied in items 2A and 2B and in item 5C, columns 2 and 4, for 1984 on this form, will satisfy the **mandatory** reporting requirement of Census Form MA-121 (title 13, U.S. Code). Although you are not required to complete the other items, your cooperation on these voluntary items is essential to make the results of this survey comprehensive, accurate, and timely.

NOTICE – Your report to the Census Bureau is **confidential** by law (title 13, U.S. Code). It may be seen only by sworn Census employees and may be used only for statistical purposes. The law also provides that copies retained in your files are **immune from legal process.**

Item 1 – NAME AND ADDRESS OF COMPANY *(Please correct any error in name and address, including ZIP code)*

Group	Survey
4	4001

YOUR FILE COPY

GENERAL INSTRUCTIONS

- Please complete this form and return within 60 days in the envelope provided. Retain the file copy for your records. THIS REPORT SHOULD COVER YOUR ENTIRE COMPANY, INCLUDING ALL SUBSIDIARIES AND AFFILIATES, UNLESS OTHERWISE DESIGNATED.
- Enter "None" where appropriate rather than leaving a blank space.
- Reasonably accurate estimates are acceptable.
- Figures for 1983 are those reported by your company last year. The 1983 figures should be revised, *if* necessary, to be comparable with 1984 data.
- Explain in "Remarks" on the back page any substantial increases or decreases in 1984 figures over 1983 (e.g., new government contracts, acquisitions, mergers, divestitures, etc.)

PLEASE READ ENCLOSED INSTRUCTIONS BEFORE COMPLETING THIS FORM

Section I – GENERAL COMPANY DATA

Item 2 – DOMESTIC SALES, RECEIPTS, AND EMPLOYMENT FOR COMPANY	CT1	1983 [1]	1984 [2]
A. Domestic net sales and receipts of this company *(Thousands of dollars)*	2001	$	$
B. Total domestic company employment in all activities during the pay period which includes the 12th of March 1983 and 1984	2002		

Item 3 – RESEARCH AND DEVELOPMENT EXPENDITURES

Are research and development expenditures for entire domestic company, including subsidiaries and affiliates, reported on this form? ☐ YES ☐ NO – *Please explain in remarks or on transmittal letter.*

Section II – RESEARCH AND DEVELOPMENT PERFORMED WITHIN THE COMPANY IN THE UNITED STATES

Exclude R&D financed by the company but performed by others. Report such R&D in section III.

Item 4 – NUMBER OF RESEARCH AND DEVELOPMENT SCIENTISTS AND ENGINEERS Apportion on a full-time equivalent basis *(See Instruction Manual, page 2)*	CT2	January 1984 [1]	January 1985 [2]
TOTAL →	3099		

Item 5 – COST OR RECEIPTS FOR RESEARCH AND DEVELOPMENT PERFORMED WITHIN THE COMPANY BY MAJOR TYPE AND SOURCE OF FUNDS (include depreciation and overhead; exclude R&D capital expenditures) *(See instruction manual.)*

		CT2	Thousands of dollars			
			1983	1984		
			TOTAL research and development [1]	Federal funds [2]	Company and other funds, except Federal [3]	**TOTAL** *(Sum of columns 2 and 3)* [4]
A. Basic research *If "None," please mark* ☐ 35105		3510	$	$	$	$
B. Applied research and development	1. Applied research	3521				
	2. Development	3522				
	3. **TOTAL** *(Sum of lines 1 and 2)*	3529				
C. TOTALS *(Sum of A and B3)* →		3599				
D. 1983 TOTALS →		3598		$	$	$

	CT1	[1]
E. Company and other funds, except Federal, budgeted for the year 1985 →	3800	$

Item 6 – RESEARCH AND DEVELOPMENT BY FUNCTIONAL CATEGORY (Of the total reported in Item 5C, COST OR RECEIPTS FOR RESEARCH AND DEVELOPMENT, *columns 2 and 4, report the following functional categories.)*

ENERGY RESEARCH AND DEVELOPMENT Included the project cost or portion of project cost incurred for the purpose of increasing energy resources or capabilities. Include cost by type of energy. *If "None," please mark (x)* ☐ 80996	CT2	Thousands of dollars				
		1983		1984		1985
		Federal funds [1]	Total funds [2]	Federal funds [3]	Total funds [4]	Total projected costs [5]
A. Total nuclear	8010	$	$	$	$	$
B. Total fossil fuels	8020					
C. Total geothermal, solar, and conservation and utilization	8030					
D. All other energy	8050					
E. TOTAL of A through D →	8099	$	$	$	$	$

POLLUTION ABATEMENT RESEARCH AND DEVELOPMENT – Include the project cost or portion of the project cost incurred for the purpose of designing pollution abatement products or product characteristics or of designing pollution abatement features into processes. *If "None," please mark (x)* ☐ 81996	CT2	Thousands of dollars				
		[illegible]		1984		1985
		[illegible]	[illegible]	Federal funds [3]	Total funds [4]	Total projected costs [5]
TOTAL →	8199			$	$	$

Section III – RESEARCH AND DEVELOPMENT PERFORMED OUTSIDE THE DOMESTIC COMPANY

(Not included in item 5 with company funds.)

Item 7 – TOTAL COMPANY FUNDS SPENT FOR RESEARCH AND DEVELOPMENT ACTIVITIES PERFORMED BY FOREIGN AFFILIATES OUTSIDE THE UNITED STATES	CT2	Thousands of dollars	
		[illegible]	1984 [2]
If "None," please mark (x) ☐ 11603	1160		$

Item 8 – STATUS OF THIS COMPANY ON DECEMBER 31, 1984

A. Was the company listed in Item 1 owned or controlled by another company on December 31, 1984? ☐ Yes – *Complete item 8B* ☐ No

B. New owner information

Name			Date acquired
Address *(Number and street)*			Federal Social Security Employer Identification Number, *if available*
City	State	ZIP code	

REMARKS

Name of person to contact regarding this report	Address *(No. and street, city, State, ZIP code)*	Telephone		
		Area code	Number	Extension

Period covered by this report ☐ Calendar year ☐ Fiscal year – *Specify* →	From – *Month/day/year*	To – *Month/day/year*

CERTIFICATION – This report is substantially accurate and has been prepared in accordance with instructions.

Name of company	Address *(No. and street, city, State, ZIP code)*	
Signature of authorized official	Title	Date